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May
1960

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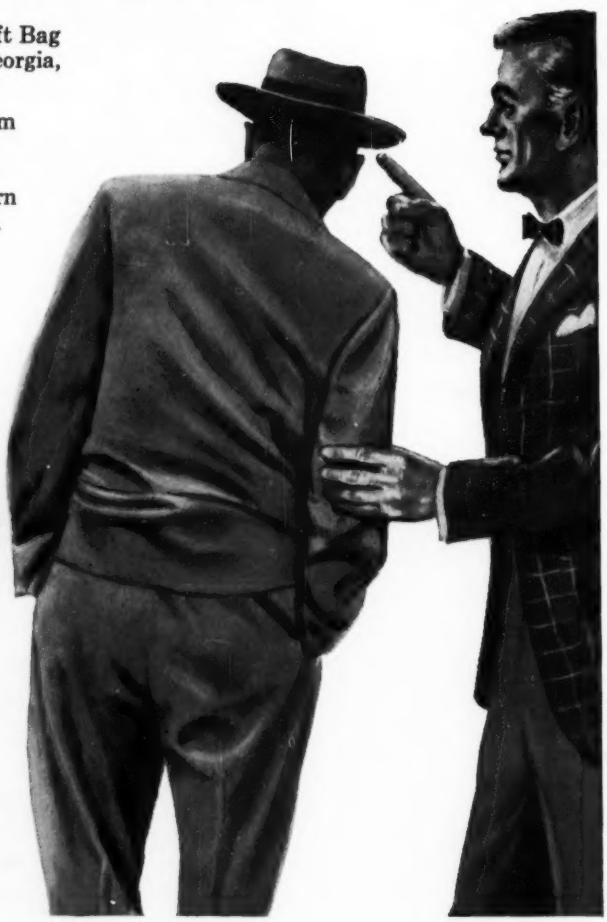

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and PLANT FOOD INDUSTRY

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Commenting Freely

by BRUCE MORAN

Jonothan Garst, the farmer who entertained Khrushchev, has come up with a plan seen by many as important diplomatic tool. We have been feeding ten million hungry people in India. And while the State has built a great deal of fertilizer capacity, the production of food has not by any means kept up with the population explosion there.

What Farmer Garst proposes, lest they get the idea our feeding program is a permanent subsidy, that we push for 36 big fertilizer plants in India so that the nation can become self-sustaining food-wise.

As we have pointed out before, in these pages, there is a further problem . . . a bottleneck. This is education of the farmer so he can be ready to use all this plant food when, as and if it is ready for him. Then the Garst proposal of $600,000,000 to build 3,600,000 annual tons of N capacity, with Uncle Sam putting up 25%—other nations joining in, can become practical.

A grand conception,—but one that will take some working out, governments being what they are!

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Experienced Phillips *66* Technical Service Men travel thousands of miles each year to help fertilizer manufacturers net a greater profit return. They work with you—"at your plant"—to help solve production problems, lower material costs, work out more profitable formulations and improve operating efficiency.

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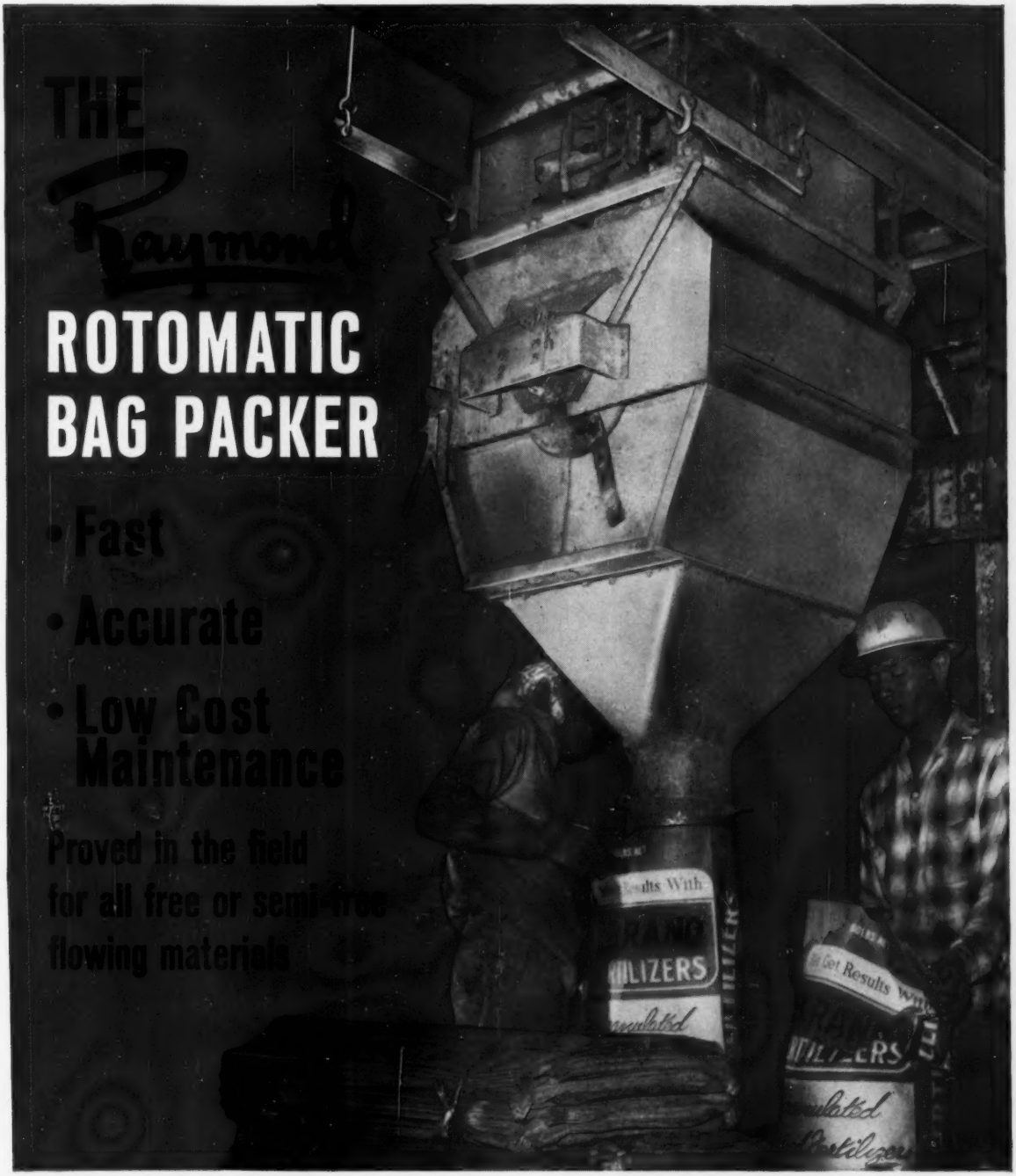

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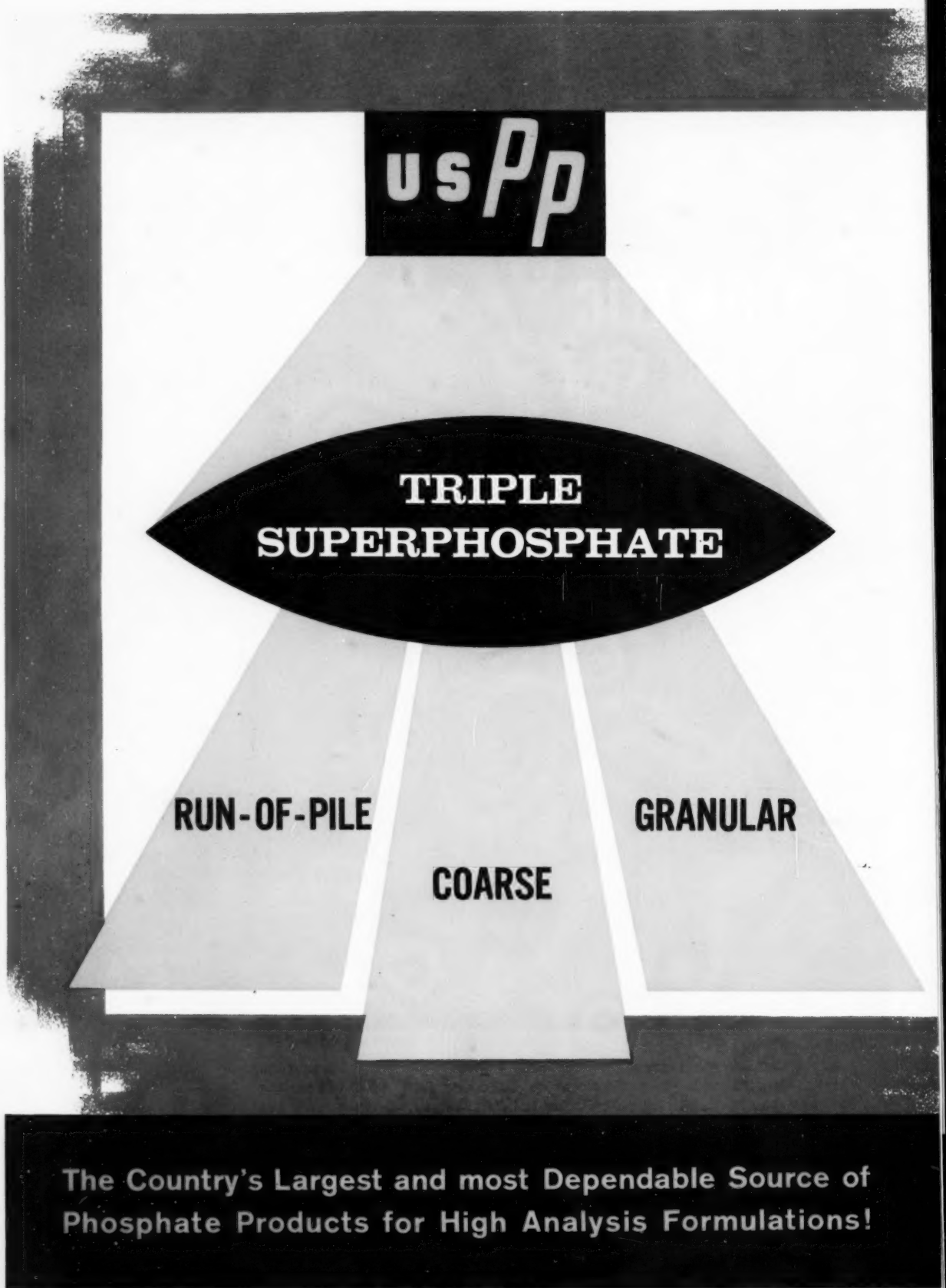
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JUST AROUND THE CORNER

By Vernon Mount

Leftward the course of politics takes its way in this election year. But this is not really a radical Congress and a lot of the basis for oratory is political, rather than really in the interest of the "Peepul."
But the trend is, nevertheless, to the left, and if many of the ideas go through, there could be a new inflationary spiral. We are going to witness a throwback to the New Deal, even on the Republican side.

Farm legislation will be side-stepped because nobody seems able to agree what we need. The Soil Bank dies as far as new land is concerned. What is now under the law will stay there, even though it is obviously an impractical scheme . . . and very expensive.

Keep an eye out for the direction of political thinking, and you may want to trim your sails accordingly.

Yours faithfully

Vernon Mount

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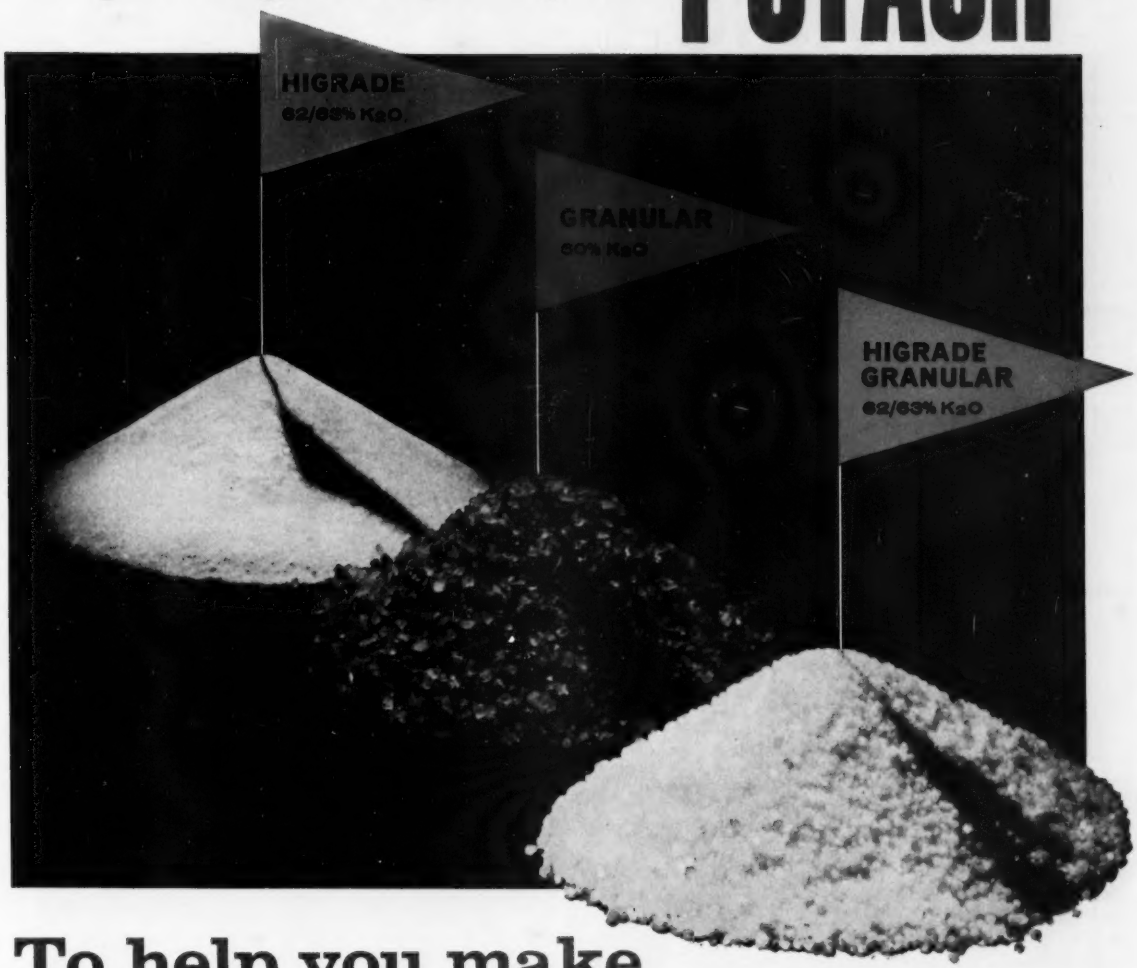

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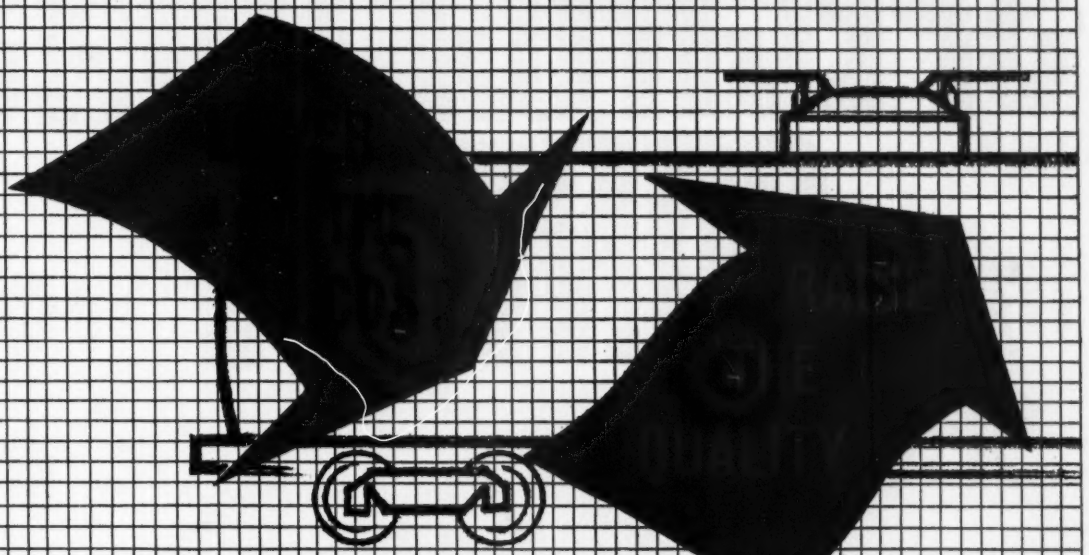

OF YOUR MIXED FERTILIZERS

It's a pleasure to tell you about the new, exclusive (patents pending) DRI-SOL Nitrogen Solutions. This new line represents a significant advancement in ammoniating solutions. In making mixed fertilizers, you will find the performance of these solutions quite impressive. You can count on at least 7 distinct benefits:

1. Reduced shipping costs. 2. Better process control in continuous ammoniation. 3. Lower formulation costs. 4. Lower drying costs, increased dryer capacity, or a drier product. 5. Increased plant capacity. 6. Faster curing and quicker shipment. 7. Improved quality of both conventional and granular fertilizer.

In addition to these 7 advantages, you may find still other ways in which these unique DRI-SOL solutions can be useful to you. For example, these solutions can be used to help offset the high water content of low strength acid, or to produce those grades which are difficult or impossible to make with conventional solutions.

CSC's DRI-SOL Nitrogen Solutions are available in grades ranging from 24% ammonia and 76% ammonium nitrate to equal parts by weight of ammonia and ammonium nitrate. This new line of solutions is essentially anhydrous. Water content: about 0.5%.

DRI-SOL solutions are generally available in the Southern and Midwestern States. Technical literature available to fertilizer manufacturers.

AGRICULTURAL CHEMICALS DEPARTMENT

COMMERCIAL SOLVENTS CORPORATION CSC

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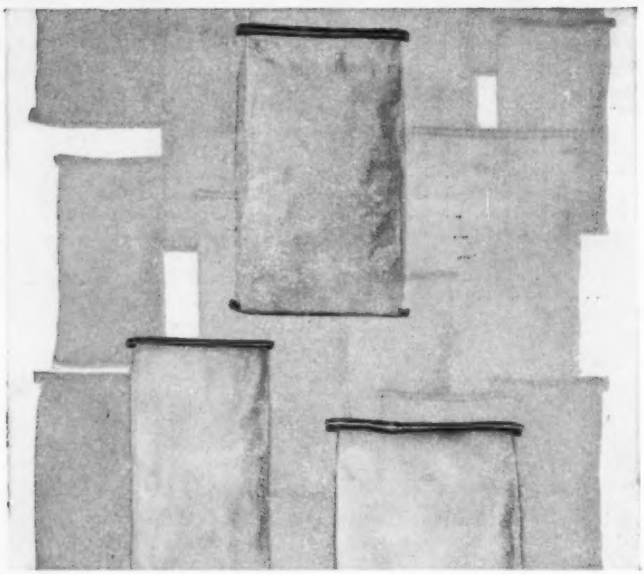

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Arcadian® News

Volume 5 | For Manufacturers of Mixed Fertilizers | Number 5

How to Make Your Plant a Safer Place to Work

You can make your fertilizer plant a safer place to work. Take hazards out of production and build safety into your manufacturing processes!

Disregarding safety for the sake of production short cuts just isn't good business sense. It is imperative to protect your employees and yourself from accidents. Fortunately, the safe way is usually the most economical way to produce fertilizer.

Plan now to eliminate conditions in your plant that might cause costly accidents. Look at all phases of your operation—large and small.

Accidents can happen to anyone suddenly faced with an unusual situation—or, an injury may even occur during the performance of routine duties. For example, an old friend and frequent enemy of man—the ordinary ladder—is still a prime contributor to worker injuries. Ladders alone cause approximately 40,000 painful falls each year. Time lost on the job from ladder injuries can be serious and expensive for employee and employer alike. Fatalities are tragic.

Most accidents with men, equipment and materials can be avoided. Through only a little effort and cost, plant situations that might cause accidents can be foreseen and eliminated.

But this is only one phase of the safety problem. As chemical processing increases in fertilizer manufacturing, more production hazards are created. To be safe, you should know what is going on, chemically, at all times in your plant.

Good safety records usually result from the following:

1. Serious efforts to eliminate dangerous conditions in the plant.

2. Thorough training of personnel in safe work practices.

It might pay you to carefully examine your own plant, keeping in mind the following check-list:

A. Many accidents are caused by poor operating conditions. Bad equipment or poorly-trained workers can lead to combining wrong ingredients that will bring real trouble. Some examples:

1. *Increasing the amount of acid to control ammonia fumes, when there is no good reason for these fumes.*

2. *Use of abnormally high amounts of acid to obtain heat when some of this heat can be added in the dryer.*

3. *Or, creating too much heat in the dryer to achieve results that could be partially or fully accomplished through safer channels.* (*continued on following page*)

HOW TO MAKE YOUR PLANT A SAFER PLACE TO WORK

(*continued from preceding page*)

4. *Allowing too many shields or ventilation that deprive the operator of a ready means to detect hazardous conditions.*

5. *Use of gas masks during all normal operating time. This may deprive personnel of distant or early warnings. There is something seriously wrong when regular operators are required to wear gas masks constantly. However, safety goggles should be worn everywhere throughout work periods.*

B. Proper respect should be given to actions of chemicals, heats and pressures on eyes, lungs and skin, as well as on metals, rubbers and organic materials. Common abuses are:

1. *Delaying medical attention for accident victims.*

2. *Handling acids without goggles and rubber gloves, or ammonia without gas masks.*

3. *Using low-pressure diaphragms with anhydrous ammonia.*

4. *Using rubber in gaskets, valve diaphragms and hoses that conduct sulfuric acid. Some synthetics are suitable for use with sulfuric acid, and the supplier should be consulted about their adaptability. Good grades of rubber are suitable for phosphoric acid.*

C. Applying high heat to equipment that has not been cleaned thoroughly can cause explosions. This carelessness still is a perennial source of accidents, some of them fatal.

D. Handling acids, particularly sulfuric acid, is dangerous. Detailed instructions are available from acid suppliers. They should be posted conspicuously in the plant, and followed to the letter. Some precautions are:

1. *Avoid all contacts with the body.*

2. *Get medical attention immediately when there is an accident.*

3. *Flush affected areas with clean water for at least 15 minutes.*

4. *Use water at low pressure for the eyes.*

5. *Always wear suitable goggles and headgear, preferably a safety helmet, around all acids. Add rubber gloves, full face shields, rubber safety shoes, and approved clothing when dangers are great.*

E. Sulfuric acid releases hydrogen when it reacts with ferrous metals. When this action takes place in a closed vessel or piping, very high pressures can develop. Hydrogen is also a serious fire and explosion hazard over a wide range of mixtures with air. Some things to remember:

1. *Steel is a suitable material for handling sulfuric acid at and above 77% concentration (60°Be) with some exceptions.*

2. *Moisture added to the acid even from the air will greatly increase its corrosive power.*

3. *Corrosion of steel piping is greatly increased when the velocity of sulfuric acid in the piping exceeds 10 feet per second, or about 9 gallons per minute in 1½ inch extra-heavy steel pipe.*

F. Furnaces cause many accidents. Establish safe starting and shutdown, particularly for gas furnaces.

G. It is unsafe to have large quantities of acid under pressure in the plant. Use pumps instead of air pressure.

H. Watch out for the release of dangerous chemicals in large volume. Use safe hose connections that are usually not quick-acting.

I. Exercise care in the combination of combustible materials, including mixed fertilizers.

J. Practice good housekeeping:

1. *Build guards around all chains, gears, belts and exposed moving parts.*

2. *Insulate wiring and guard light bulbs.*

3. *Disconnect piping of dangerous materials for repair work.*

4. *Use lock-outs, interlocks and remove fuses of electrical equipment for repair work.*

5. *Maintain adequate lighting.*

6. *Keep ladders in good condition, and see that employees are trained in their use.*

7. *Maintain enough pressure gauges in proper condition.*

8. *Have safety valves in good working order, and placed correctly.*

9. *Keep your gauge glasses guarded.*

10. *Locate overflow and discharge devices safely.*

11. *Maintain escape routes for personnel.*

12. *Provide a safe means for obtaining samples.*

13. *Make sure tank cars can be connected safely.*

14. *Keep floors as dry as possible. Post signs to warn employees about wet, slippery floors.*

Now is a good time to check over your manufacturing operation to see if your plant is a safe place to work. You probably will discover some ways to produce fertilizer more efficiently and at lower cost. However, remember to look carefully at all attractive short cuts. They could be dangerous!

4-H CLUB and F.F.A. ACTIVITIES sponsored by Nitrogen Division

5 YEARS with 4-H

Nitrogen Division marks 1960 as the fifth consecutive year of sponsorship of the National 4-H Field Crops program. During that time approximately TWO MILLION young men and women learned modern farming skills through participation in the Field Crops program. These young people kept detailed records of expenditures and cultural practices, ran comparison tests, and worked always to "make the best better." The National Committee on Boys and Girls Club Work, located in Chicago, acts as the liaison agency between donors and the Federal and State Extension Service, which operates the program. As a donor, Nitrogen Division provides six $400 scholarships to the national winners, all-expense trips to the annual 4-H Club Congress to state and national winners, and a maximum of four gold medals to county winners. In addition, the Division helps finance efforts to enroll more members in Field Crops, and is hard at work revising the local leaders' manual to place more emphasis on soil fertility testing.

7 YEARS with F.F.A.

Nitrogen Division has contributed to the Future Farmers of America Foundation for seven consecutive years. Division headquarters in New York is always a principal stop on the annual good-will tour of the national officers of FFA. This year the officers demonstrated keen interest in an illustrated talk by Dr. Harvey Stangel, chief agronomist for Nitrogen Division. This farm youth group, with a current membership of 380,000, is open only to boys studying vocational agriculture in high school. The FFA and the vocational agriculture program are administered by state departments of education and the U. S. Office of Health, Education and Welfare.

John Coverdale (left), president of the National Committee on Boys' and Girls' Club Work, presents National 4-H Donor Merit Award to Jacob White, president, Nitrogen Division, Allied Chemical. The award denotes 5 years' sponsorship in the National 4-H Club Field Crops Program.

The six national 4-H Field Crop winners line up with an oversized loaf of bread showing the share of the consumer's bread dollar that is paid to the grower of the grain. Each of the winners received a $400 college scholarship from Nitrogen Division, Allied Chemical.

National officers and advisors of the Future Farmers of America were guests of Nitrogen Division in New York on their annual good-will tour of the U.S. With the boys are Jacob White, president, Nitrogen Division, Allied Chemical, and Frank J. French, president, General Chemical Division.

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	CHEMICAL COMPOSITION %						PHYSICAL PROPERTIES		
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NITRANA®									
2	41.0	22.2	65.0	—	12.8	10.8	1.137	10	21
2M	44.0	23.8	69.8	—	6.4	10.8	1.147	18	15
3	41.0	26.3	55.5	—	18.2	12.8	1.079	17	-25
3M	44.0	28.0	60.0	—	12.0	12.7	1.083	25	-36
3MC	47.0	29.7	64.5	—	5.8	12.6	1.089	34	-30
4	37.0	16.6	66.8	—	16.6	8.9	1.184	1	56
4M	41.0	19.0	72.5	—	8.5	9.2	1.194	7	61
6	49.0	34.0	60.0	—	6.0	13.9	1.050	48	-52
7	45.0	25.3	69.2	—	5.5	11.2	1.134	22	1
URANA®									
6C	43.0	20.0	68.0	6.0	6.0	9.3	1.180	12	39
6M	44.0	22.0	66.0	6.0	6.0	10.0	1.158	17	14
10	44.4	24.5	56.0	10.0	9.5	11.0	1.114	22	-15
11	41.0	19.0	58.0	11.0	12.0	9.2	1.162	10	7
12	44.4	26.0	50.0	12.0	12.0	11.7	1.087	25	- 7
13	49.0	33.0	45.1	13.0	8.9	13.5	1.033	51	-17
15	44.0	28.0	40.0	15.0	17.0	12.7	1.052	29	1
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SOVIETS PLAN TO TRIPLE MINERAL FERTILIZER OUTPUT

by G. STANLEY BROWN
Foreign Agricultural Analysis
Foreign Agricultural Service

Control figures for the Soviet Union's current Seven Year Plan call for a tripling of the 1958 output and use of mineral fertilizer by 1965. This planned expansion is necessitated by the drive to attain self-sufficiency in agricultural commodities, and by the expressed Soviet goal of improving the USSR's export capability for agricultural commodities. Success in the fertilizer program will be a key to achieving the extremely ambitious goal of increasing gross agricultural production by 70 percent during the years 1959-65.

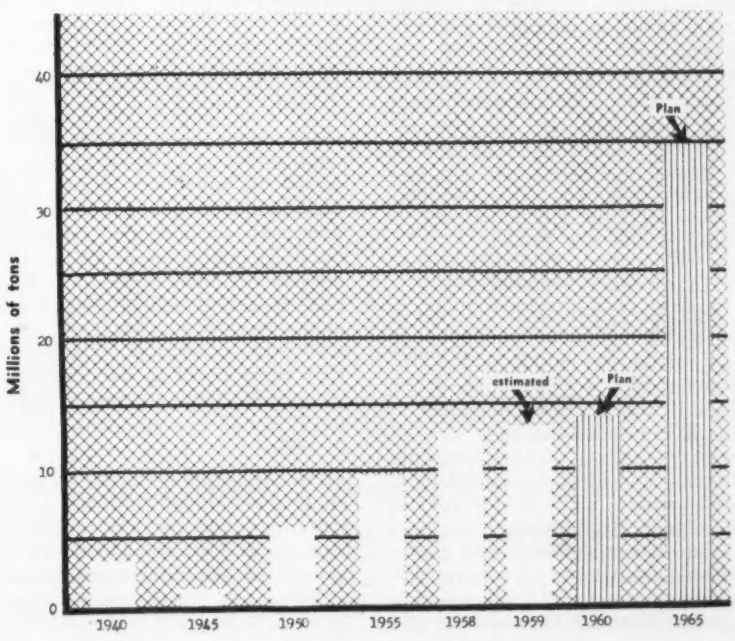
The planned growth of agricultural output during the current Seven Year Plan period is to be based on expansion of crop acreage and high crop yields. In recent years much of the growth in agricultural production has resulted primarily from expansion of crop acreage. Although some additional acreage is to be brought into production during the current Plan period, the total amount will be limited by the scarcity of suitable land and the high costs of reclamation. Therefore, increasing production by raising yields is assuming greater importance in Soviet planning. Improved varieties and better agro techniques are to help boost average yields, but considered even more important is mineral fertilizer—though some attention will be given to organic fertilizer.

Fertilizer Expansion

According to the control figures of the Seven Year Plan, the production of mineral fertilizer in the USSR is to increase from 12.4 million metric tons in 1958 to 35.0 million metric tons in 1965*. The output will rise rather modestly during the early years of the Plan period. By 1965, however, the annual increment to production will be more than four times as great as in the early years, as new factories are brought into production and existing factories modernized. New factories are to be constructed throughout the principal agricultural areas of the country, not only on the basis of the location of raw materials and energy, but also on the basis of the planned regional fertilizer consumption patterns.

Natural gas is to be used extensively as a raw material for the production of nitrogen fertilizer in the north and northwest regions of the RSFSR, as well as in Belorussia, the Baltic Republics, and in the North Caucasus. The construction of potash and superphosphate plants in these areas will make available the fertilizer necessary to meet local requirements. Previously, only limited quantities of fertilizer were produced in these areas. In the Central Black Earth and Central Non-Black Earth zones, existing plants for the production of nitrogenous fertilizers, superphosphate, and ground phos-

Soviet Output of Mineral Fertilizers



* References to mineral fertilizer throughout this article are expressed in terms of actual fertilizer, not in terms of plant nutrients (N, P_2O_5, and K_2O). In Soviet statistical practice, the production of nitrogen fertilizer is reported in terms of ammonium sulphate (20.5% N), phosphate fertilizer at 18.7% phosphoric anhydride (P_2O_5), and potash fertilizer as 41.6% potassium oxide (K_2O). The production of ground phosphate rock is expressed as standard content of 19% P_2O_5.

phate rock will be expanded significantly, and at the same time, new plants are to be constructed. The exploitation of rich potash deposits in the Urals, one of the centers of fertilizer production in the Soviet Union, is to be stepped up. In the Ukraine, which is second in fertilizer production only to the RSFSR, few new plants are to be constructed, but existing enterprises are to be reconstructed and expanded.

Types of Fertilizer

As in the past, most of the output will be in the form of low-quality straight fertilizers. It has been reported, however, that "to free the transport system from the shipping of useless ballast in low analysis fertilizers" the production of concentrated fertilizers will be initiated. Also, the production of granulated nitrogen and phosphorous fertilizers will be expanded. Although commercial production of urea is to be initiated during this period, the emphasis seems to be on its use as a livestock feed, with only limited quantities of urea being used as fertilizer. There are no indications that the Soviets intend to introduce the production of complex fertilizers on a commercial scale. However, the Soviets have indicated that they intend to produce factory-mixed fertilizers, which should result in more economic utilization on the farms.

The use of liquid nitrogen fertilizers (anhydrous ammonia and aqueous-ammonia) in the USSR has been limited largely to the irrigated cotton-growing regions of Central Asia. However, the use of these fertilizers probably will expand considerably during the period under consideration. The Russians claim that these fertilizers not only are cheaper to transport, store, and introduce into the soil than are solid mineral fertilizers, but also that plants for their production can be built quicker and cheaper.

Shifts in Consumption

Farm use of mineral fertilizer is scheduled to increase from 10.6 million metric tons in 1958 to 31.3 million metric tons in 1965. Up to the present time, mineral fertilizer in the Soviet Union has been used almost exclusively on the industrial crops—cotton, flax, sugar beets, and such—with as much as one-third of the total available nitrogen being allocated to cotton alone. With the increased availability of mineral fertilizer, the utilization pattern will change; however, priority will still be given to the industrial crops.

Delivery of fertilizer to the cotton-growing republics during the Plan period will increase less than will deliveries to other republics, as fertilizer requirements for cotton have been largely fulfilled. Intentions are to allocate a total of 9.0 million metric tons of mineral fertilizer to agriculture for use on technical crops in 1965. According to the Soviets, this will assure the planned yields of these crops at the end of the Plan period.

The greatest shift in the use of mineral fertilizer is the planned allocation of 10.0 million metric tons for the fertilization of grain. It will be used in areas of adequate rainfall, chiefly in European USSR, where it can be used most effectively; and much of it will be applied to corn, primarily in the Ukraine, where the Soviets are attempting to emulate the corn-hog farming system of the U. S. Corn Belt. Important acreages of the bread grains (primarily wheat) also will be fertilized. By the application of 10.0 million metric tons of fertilizer onto approximately 75 million acres of grain, the Soviets expect to increase grain production by about 30 million metric tons, or an average increase of about 15 bushels of 60 pounds per acre.

Another significant shift, to be effected by 1965, will be the use of about 6.0 million metric tons of fertilizer on forage crops. Forage crops had been accorded one of the lowest priorities in the allocation of mineral fertilizer. Then came the widely propagandized campaign to surpass the United States in the production per capita of meat, milk, and butter. Priority among crops was shifted, and during the past 4 years the acreage sown to forage crops increased by about 40 million acres. The use of 6.0 million metric tons of mineral fertilizer on forage crops is but another indication of Soviet recognition of the need to increase the traditionally poor supplies of animal feeding stuffs if the animal husbandry production goals are to be approached. The result, they believe, will be the production of enough feedstuffs for an additional 27 million metric tons of milk in 1965.

The allocation of 3.5 million metric tons of mineral fertilizer to potatoes and vegetables reportedly will permit the fertilization of 70 percent of the potato acreage and 80 percent of the vegetable acreage on collective and state farms. This, undoubtedly, represents a two-pronged Soviet program designed first, to relieve the monotony of the average Soviety diet by increasing the output of vegetables on state and collective farms; and second, to reduce the importance of the private plots, which traditionally have supplied most of the vegetables to urban consumers. The Plan also calls for the use of about 2.0 million metric tons of mineral fertilizers on fruit and tea plantations.

Handling and Storing

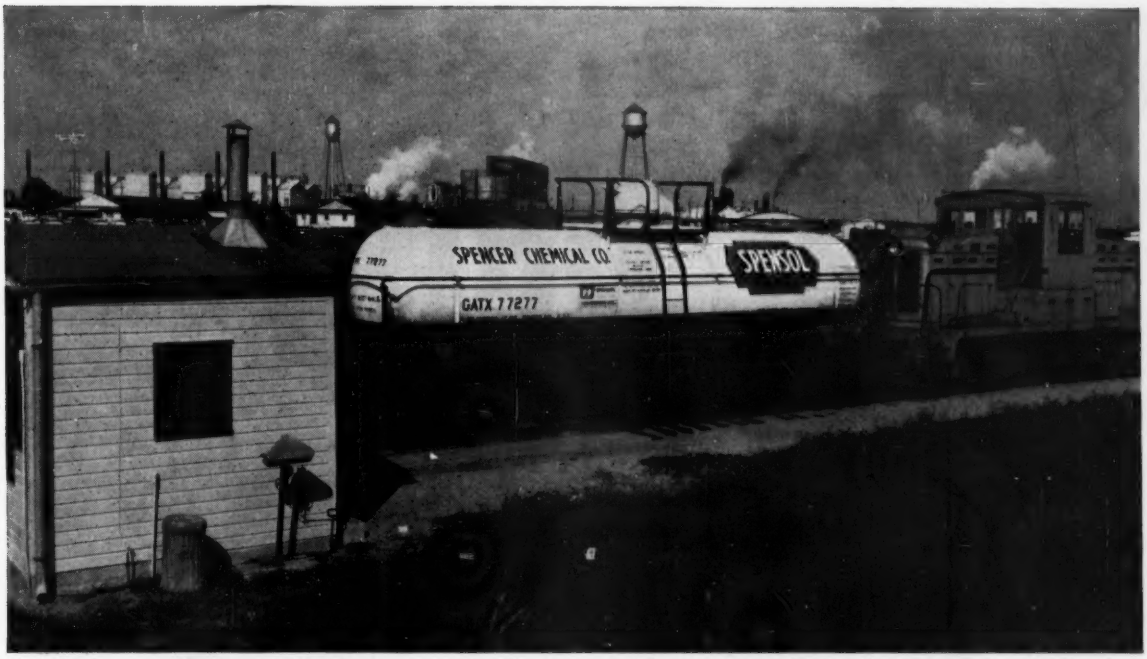
There is much room for improvement in the handling, storing, and application of fertilizer if the Soviet Union is to realize the full potential of its fertilizer program. The Soviet press has long carped about shortcomings in the use of fertilizer on state and collective farms. The practice of dumping fertilizer in the open, along rail sidings, and allowing it to deteriorate, as engaged in by Soviet railroads, is another blatant example of fertilizer waste. Such practices have resulted in the report that 17 percent of all fertilizer delivered to the cotton-growing regions of Central Asia is wasted; average losses of 15-20 percent are commonly reported.

Doubtful Success

Finally there is the question of whether or not the Soviet Union will achieve its fertilizer production goals by 1965. On the basis of what has happened in the past it appears most unlikely. In the Sixth Five Year Plan the mineral fertilizer goal was set at 19.6 million metric tons by 1960. In the current plan the yearly goal for 1960 was scaled down to only 13.5 million tons, despite the importance attached to greater fertilizer production.

While the Soviet Union may not triple its 1958 output of 10.6 million metric tons by the end of the Plan, certainly it will raise it considerably—probably as much as double. This amount of fertilizer would contribute substantially to the Soviet drive to raise agricultural production. But in terms of utilization per sown acre it would mean that the Soviet Union in 1965 would be using less than half the amount the United States was using 10 years earlier.

Mr. Brown's report on Russia's Fertilizer plans is taken from the Foreign Agricultural Service's FOREIGN AGRICULTURE, *March, 1960.*



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Brand E	.234	2,030%
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COST OF PRODUCING LIQUID and SOLID MIXED FERTILIZERS

by

H. G. Walkup *and* N. L. Spencer

Introduction

Liquid mixed fertilizers represent a segment of the fertilizer industry which has grown rapidly in some areas of the United States during the last 5 years. Much of the growth of liquid mixed fertilizers has occurred in the Southwest, Far West, and Midwest. The introduction of liquids in the southeastern section of the United States, however, has come more recently. As yet, they do not represent a significant proportion of all mixed fertilizers used in the area. Their potential for growth is still to be tested.

Method of Analysis

One of the criteria for assessing the prospects for success of new developments in an industry is the cost of production and distribution. This criterion usually is employed in a comparison between the new method and established methods of doing things. In this case, we compared costs of producing and distributing liquid mixed fertilizers with the costs of producing and distributing solid mixed fertilizers in the Southeast. If the new method—liquid mixed fertilizer production and distribution—had been used for several years throughout the Southeast, a field survey could have been conducted to obtain actual costs. But, since the liquid fertilizer industry in this area is still in its infancy, we depend on our knowledge of the liquid industry in other areas, of technical requirements for production and distribution, of the solid mixed fertilizer industry in the Southeast, and of other conditions which relate directly to this area. All of these elements are included in a cost comparison of the production and distribution of liquid and solid mixed fertilizers.

Cost estimates are made for hypothetical plants producing liquid and solid mixed fertilizers at 4 locations in the Southeast. Primarily, the cost estimates are based on (1) investment in processing plants, (2) cost of raw materials, (3) cost of processing raw materials into finished products, (4) cost of storage for finished products, and (5) cost of distribution from the producer to the farmer (but not including the costs of applying the fertilizer on the farm). For each of 4 locations, costs of production and distribution are estimated for three ratios of mixed fertilizer. It is assumed that the costs of building and operating the plants and distributing the products will remain constant for each type of fertilizer regardless of grade of fertilizer and plant location. Raw material costs are determined for each grade at each plant location.

Equipment and Processes

Although much of the solid mixed fertilizer in the Southeast is produced in batch-type plants, a cost analysis relating to the near future probably should consider the use of a continuous flow process. For this reason, the TVA continuous ammoniator process is assumed in developing the solid mixing plant cost estimate. Relatively low-analysis nongranular or semigranular grades typical of the Southeast are used in developing the production cost estimates. The dryer, cooler, sizing screen, and recycling equipment usually used in the TVA continuous ammoniator process for producing high-analysis granular fertilizers are omitted.

Solid Plant

A flow diagram indicating principal pieces of equipment in the solid fertilizer plant is shown in Figure 1. Solid raw materials usually arrive at the plant by rail car. From the rail car, these solid materials are transferred to raw material storage bins. When the plant is operating, solid raw materials are transferred from storage bins to an elevator hopper by shovel loader. The solid materials are discharged from the elevator into overhead holding bins. From these holding bins materials are discharged into a common weigh hopper. After

FIGURE 1. Flow Chart for Solid Fertilizer Plant

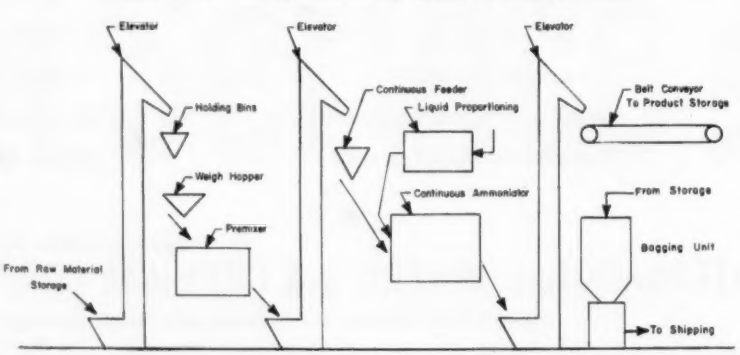


TABLE 1. Plant Operating Costs for Solid Mixed Fertilizers in the Southeast

(30,000-ton annual sales)

Item	Comment	Cost $/year	Cost $/ton
Operating labor	Estimated	27,700	0.92
Maintenance	10% of fixed capital cost	20,000	0.67
Supplies	15% of maintenance cost	3,000	0.10
Power	At $0.01/kw.-hr.	4,000	0.13
Water	At $0.20/1000 gal.	600	0.02
Insurance	1% of capital cost	2,000	0.07
Taxes	2% of capital cost	4,000	0.14
Analysis	Estimated	1,500	0.05
Depreciation	$200,000 in 10 yr.	20,000	0.67
Overhead	60% of labor	16,600	0.55
		99,400	3.32
Bags		90,000	3.00
Total estimated manufacturing cost		**189,400**	**6.32**

TABLE 2. Plant Operating Costs for Liquid Mixed Fertilizers in the Southeast, Excluding the Cost of Materials

(5000-ton annual sales)

Item	Comment	Cost $/year	Cost $/ton
Operating labor	Estimated	3,250	0.65
Maintenance	3% of fixed capital cost	1,935	0.39
Supplies	15% of maintenance	300	0.06
Power	At $0.015/kw.-hr.	100	0.02
Water	At $0.20/1000 gal.	150	0.03
Insurance	1% of capital cost	645	0.13
Taxes	2% of capital cost	1,290	0.26
Analysis	Estimated	100	0.02
Depreciation	$64,500 in 10 yr.	6,450	1.29
Overhead	50% of labor	1,625	0.33
Total estimated manufacturing cost		**15,845**	**3.18**

weighing, the solid materials in properly proportioned amounts are fed into a rotary premixer which discharges into the hopper of a weigh feeder. This weigh feeder discharges material continuously into the continuous ammoniator. Liquid raw materials, also usually received by rail, are pumped from storage into the liquid proportioner and then into the ammoniator. Final mixing, of course, occurs in the rotating ammoniator. The mixed product continuously flowing from the ammoniator is then carried by elevator and belt conveyor to product storage bins. The product is later removed from storage by shovel loader and transferred to the bagging unit. Bagged material is then loaded out to boxcars or trucks. The total cost of this plant is estimated to be $200,000, and the annual output is 30,000 tons of solid mixed fertilizer.

Operating costs for the hypothetical solid mixing fertilizer plant are presented in Table 1. Total operating costs, including bags for the 30,000 tons output is $189,400 or $6.32 per ton for solid mixed grades.

Liquid Plant

The liquid mixed fertilizer plant uses a process of neutralizing phosphoric acid with aqua ammonia with the addition of supplemental nitrogen as urea—ammonium nitrate solution, and the addition of muriate of potash to supply potash. A flow diagram of the plant is shown in Figure 2. The plant contains a 10,000-gallon, rubber-lined tank for storage of phosphoric acid, two 12,000-gallon tanks for storage of aqua ammonia, and a 12,000-gallon tank for storage of supplemental nitrogen solution. A combination ammonia converter and cooler is provided for alternately converting anhydrous ammonia to aqua and for cooling the ammonia—phosphoric acid reaction product. When anhydrous ammonia is being converted to aqua ammonia, the anhydrous is piped from the rail car through the converted-cooler, and then is pumped into storage. When the plant is in operation, some of the reaction product solution is pumped through the converter-cooler to keep the reaction product from reaching a high temperature which would cause ammonia and water losses. An air compressor is provided for transferring liquid raw materials from tank cars to storage. Pumps and flow meters are provided to transfer and proportion raw materials to the 1,000-gallon stainless steel reactor tank. A shovel loader and weigh feeder are used for handling and feeding potash to the reactor. From the reactor the finished product may be pumped to truck, transport, or spreading equipment tanks or into storage tanks where it is held in either a 10,000-gallon mild steel tank or in one of the 5,000-gallon mild steel tanks. Total cost of this plant is $64,500 and the assumed annual output is 5,000 tons of liquid mixed fertilizer.

Operating costs for the liquid fertilizer plant are presented in Table 2. Total operating cost for the annual 5,000 tons output is $15,845, or $3.18 per ton of product.

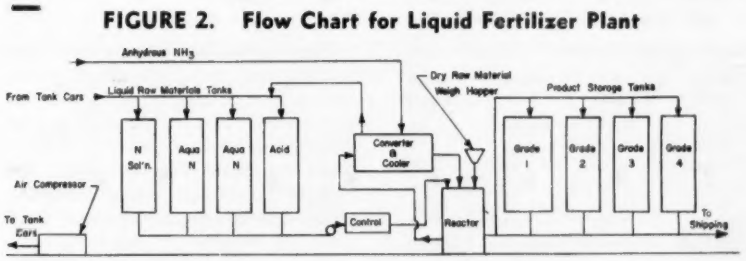
Note that we are comparing a 30,000-ton annual output solid mixing plant with a 5,000-ton annual output liquid mixing plant. Experience in other areas, particularly the Midwest, indicates that liquid mixing plants usually are much smaller than solid mixing plants in the same area.

The distribution cost from the plant to farms is estimated to be $5.00 per ton for both solid and liquid grades. This we feel is sufficient to cover the costs, not including markups or margins of delivering the product to the farmer. Spreading costs would be over and above the estimated $5.00 distribution cost.

Formulation Costs at Four Sites

The four sites selected for location of the hypothetical plants are Decatur, Alabama; Moultrie, Georgia; Hopkinsville, Kentucky; and Goldsboro, North Carolina. These sites were selected because they are within areas of intensive fertilizer use on principal cash crops and are, therefore, representative of locations of good fertilizer marketing potential. The grades of fertilizer selected for the cost estimates are either those used in considerable quantities in the above areas, or those grades recommended by the land-grant college Extension Service for use on cash crops. The formulations chosen for both the solid and liquid

FIGURE 2. Flow Chart for Liquid Fertilizer Plant



grades are conventional in the sense that they utilize raw materials that are commonly used and readily available. The formulations for solid fertilizers are typical of those used in the area for nongranular or semigranular fertilizer of the grades considered. In all but one formulation, P_2O_5 was applied as ordinary superphosphate. In this formulation a small amount of concentrated superphosphate was required also. The superphosphates were ammoniated with ammonia — ammonium nitrate solution with supplemental nitrogen added as ammonium sulfate. The source of potassium in that formulation is muriate of potash. The liquid formulations are typical of those used in many areas where liquid fertilizers make up a significant portion of the fertilizer market.

TABLE 3. Descriptions and Costs of Raw Materials Used in Estimates, January 1960

Material	Concentration of plant food	Delivered cost, $/ton at Decatur, Ala.	Moultrie, Ga.	Hopkinsville, Ky.	Goldsboro, N. C.
For Solid Fertilizer					
Ammonium sulfate	20.5% N	36.90	41.10	40.40	43.80
Nitrogen solution	44.8% N	59.43	61.30	59.25	60.39
	49% N	--	--	64.63	--
Normal superphosphate	20% P_2O_5	20.40	18.60	24.00	21.60
Concentrated superphosphate	46% P_2O_5	--	--	55.68	--
Potash	62% K_2O	35.56	37.92	37.33	39.71
Filler	--	4.00	4.00	4.00	4.00
For Liquid Fertilizer					
Anhydrous ammonia	82% N	92.20	95.60	91.80	91.60
Urea—ammonium nitrate solution	28% N	40.02	39.64	37.58	38.78
Electric-furnace phos. acid	54% P_2O_5	95.28	101.86	96.86	107.96
Potash	62% K_2O	35.56	37.92	37.33	39.71
Water	--	0.05	0.05	0.05	0.05

TABLE 4. Comparison of Costs of Solid and Liquid Fertilizers

(Includes costs of raw materials, manufacturing, and distribution to farms)

	Decatur, Alabama					
Grade	4-12-12	4-12-12	8-8-8	8-8-8	6-8-8	6-8-8
Type	Solid	Liquid	Solid	Liquid	Solid	Liquid
Total raw materials, $/ton	25.10	32.58	26.24	29.33	23.03	26.48
Manufacturing cost, $/ton*	6.32	3.18	6.32	3.18	6.32	3.18
Distribution cost, $/ton	5.00	5.00	5.00	5.00	5.00	5.00
Total, $/ton	36.42	40.76	37.56	37.51	34.35	34.66
Total, $/unit	1.30	1.46	1.57	1.56	1.56	1.58
	Moultrie, Georgia					
Grade	4-12-12	4-12-12	5-10-15	4-8-12	6-12-12	5-10-10
Type	Solid	Liquid	Solid	Liquid	Solid	Liquid
Total raw materials, $/ton	24.63	34.67	26.26	27.43	27.45	31.23
Manufacturing cost, $/ton*	6.32	3.18	6.32	3.18	6.32	3.18
Distribution cost, $/ton	5.00	5.00	5.00	5.00	5.00	5.00
Total, $/ton	35.95	42.85	37.58	35.61	38.77	39.41
Total, $/unit	1.28	1.53	1.25	1.48	1.29	1.58
	Hopkinsville, Kentucky					
Grade	10-10-10	9-9-9	4-12-8	4-12-8	6-12-12	5-10-10
Type	Solid	Liquid	Solid	Liquid	Solid	Liquid
Total raw materials, $/ton	35.37	32.97	25.50	30.80	30.38	29.93
Manufacturing cost, $/ton*	6.32	3.18	6.32	3.18	6.32	3.18
Distribution cost, $/ton	5.00	5.00	5.00	5.00	5.00	5.00
Total, $/ton	46.69	41.15	36.82	38.98	41.70	38.11
Total, $/unit	1.56	1.52	1.53	1.62	1.39	1.52
	Goldsboro, North Carolina					
Grade	5-10-10	5-10-10	3-9-9	3-9-9	8-8-8	8-8-8
Type	Solid	Liquid	Solid	Liquid	Solid	Liquid
Total raw materials, $/ton	25.31	32.43	21.04	27.11	28.80	31.49
Manufacturing cost, $/ton*	6.32	3.18	6.32	3.18	6.32	3.18
Distribution cost, $/ton	5.00	5.00	5.00	5.00	5.00	5.00
Total, $/ton	36.63	40.61	32.36	35.29	40.12	39.67
Total, $/unit	1.47	1.62	1.54	1.68	1.67	1.65

* For solid fertilizers, the manufacturing cost includes $3.00 per ton for bags.

Electric-furnace phosphoric acid is neutralized with aqua ammonia with the addition of urea—ammonium nitrate solution to supply supplemental nitrogen. Muriate of potash was added to supply potash. A list of raw materials together with plant food concentrations and delivered costs at the four plant locations is shown in Table 3.

Total Costs Compared

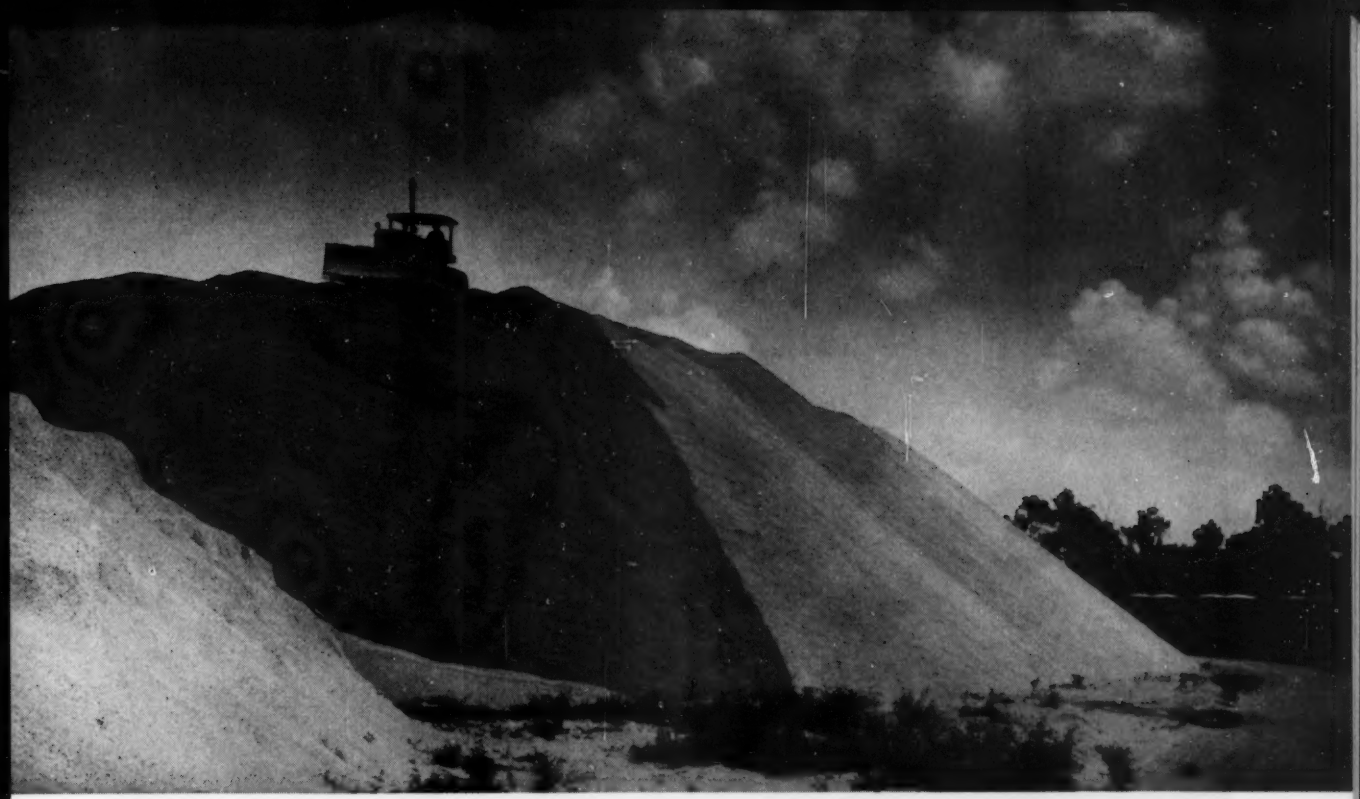
Total production and distribution costs of the solid and liquid fertilizers were obtained by adding the cost of raw materials, plant operation, and product distribution. The results are summarized in Table 4. These results show that in most cases the costs of producing and distributing liquid mixed fertilizers range from $0.02 to 0.29 per unit of plant food higher than for comparable grades of bagged solid mixed fertilizers. The principal reason for higher unit cost for liquid grades is the high cost of phosphoric acid used in the liquid formulations. The delivered price for phosphoric acid at the sites considered ranges from $1.76 to $2.00 per unit of P_2O_5 while the price of normal superphosphate used in the solid formulations ranges from $0.93 to $1.20 per unit of P_2O_5.

In some instances liquid fertilizers are less expensive to produce and distribute than solid fertilizers. The exceptions are the 1:1:1 plant food ratio products in Alabama (8-8-8 grade), Kentucky (10-10-10 grade solid and 9-9-9 grade liquid), and North Carolina (8-8-8 grade). These exceptions are due primarily to the higher cost of supplemental nitrogen used in the solid formulations. Delivered prices of ammonium sulfate used in the solid formulations range from $1.80 to $2.14 per unit of nitrogen while the cost of urea—ammonium nitrate solution used in the liquid formulations ranges from $1.34 to $1.43 per unit. Thus, as the ratio of nitrogen to P_2O_5 increases the higher cost of phosphate in the liquid formulations is offset and at a ratio of 1 to 1 the costs of the liquid products become slightly less than that for the solid products.

Summary

Plant location, within the area investigated, had little effect on the comparison of liquids and solids, although the cost of producing and distributing both types varied with plant location. For example, the cost of producing and distributing an 8-8-8 in Alabama was about $0.10

(Continued on page 36)



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Traffic Service: Cyanamid traffic specialists are ready to route and ship your orders without delays. Their knowledge can save you money, make your operation run more efficiently.

Technical Service: Cyanamid's staff of technical experts are on 24-hour alert. Often, what are new problems to you are solved problems to them. Make your formulation and production problems theirs . . . that's their job.

Sales Service: Cyanamid sales representatives are available to work with you and for you in expanding present markets or in establishing and developing new markets.

Products that serve: Cyanamid's only phosphate business is mining and manufacturing the highest quality products for your mixed fertilizer requirements.

They are:

- Florida Natural Phosphate Rock
- TREBO-PHOS® — The Triple Superphosphate with controlled porosity
- Phosphoric acid for acidulation

To manufacture fertilizers that sell . . . mix with Cyanamid's phosphates and service. American Cyanamid Company, Agricultural Division, New York 20, N. Y. **TREBO-PHOS is American Cyanamid Company's trademark for its triple superphosphate.*

CYANAMID

PHOSPHATE PRODUCTS

CYANAMID SERVES THE MAN WHO MAKES A BUSINESS OF AGRICULTURE

Auto Fleet Leasing

in the Fertilizer Industry

Preserves Liquid Capital

By A. J. Schoen

The author is president of Four Wheels, Inc., one of the nation's largest independent auto fleet leasing companies. His firm leases 12,000 automobiles to 333 clients throughout the U. S. In the fertilizer industry, their clients include a large fertilizer materials producer and two medium-size fertilizer mixing firms.

While Mr. Schoen's background quite naturally prejudices him toward fleet leasing, your editors feel that in this article he has made a sincere effort to present all facets of the company ownership-leasing-salesman ownership puzzle.

How Much Auto Fleet Leasing is Done in The Fertilizer Industry?

At the end of August, 1959, there were 240,000 cars in leased auto fleets used by all industry. Of that number, about 5,000 are leased auto fleets used by fertilizer manufacturing companies for their salesmen. Another 4,000 cars in the industry are company-owned, and still another 6,800 are owned by individual fertilizer salesmen and used for company business.

In the fertilizer materials industry, there are two major reasons why firms lease their salesmen auto fleets. First is the need to preserve liquid capital in the business. The typical fertilizer materials producer has a current ratio of about 3-to-1. This would normally be very adequate, except that this same typical manufacturer has fixed assets equal to one-half of his net worth, and inventory takes up about 60 per cent of his working capital. Moreover, the average collection period is 40 days—i.e., that's how long it takes a typical customer to pay his bills to the fertilizer producer. This means that every cent of capital in the fertilizer business is working overtime. As a result, holding on to liquid cash is a "must" for most fertilizer manufacturers. Leasing of company car fleets is one way in which this can be done. Using salesmen-owned cars is another way.

Second, many fertilizer firms have found that a leased fleet presents fewer headaches in supervision, operation and sale of used cars than does a company fleet. In addition, depending on annual mileage and allowances, a leased car fleet is usually (but not always) cheaper to operate than salesmen-owned cars, and more efficient.

What Types of Autos Are Leased?

All types. Most leased auto fleets are low-priced cars for salesmen, higher-priced for executives. Some companies lease station wagons. There is no restriction as to make, model or optional equipment.

Why Has Auto Fleet Leasing Grown So Rapidly?

Auto fleet leasing came into the picture before World War II. Some large fertilizer companies found that they could use their own capital to better advantage in production, so instead of buying their auto fleets, they leased them. After the war, medium-sized and smaller companies found the same advantage to be true. What precisely is this advantage?

If a fertilizer manufacturer buys an auto fleet costing $100,000, it takes this money out of its working capital. If this company earns profit on its working capital, for example, at the rate of 48 per cent **before taxes,** then the company would be sacrificing these profits by freezing the capital in fixed assets like an auto fleet. However, by **leasing** its fleet instead of buying, and leaving its working capital in the business, this company would be far ahead in net profits **after taxes** at the end of the leased period.

In the fertilizer industry, the average **before-tax** net profit on net working capital is 48 per cent —before Uncle Sam takes his slice. In other words, the "cost" of purchasing a fleet with a fertilizer producer's own capital would be (on the average) 48 per cent of the amount invested in autos per year.

On a $100,000 fleet, that "cost" would be $48,000 the first year, less (because of depreciation) the second year. That $48,000 is the amount of net profit (before taxes) which a fertilizer producer would forego if it pulled $100,000 out of current operations and froze the cash in fixed assets. This sum is part of the true cost of company-owned auto fleet operation.

If you compare earnings of two fertilizer manufacturers of the same size and sales volume—one company using a leased fleet of (say) 100 cars on two-year lease, the other using a company-owned fleet of 100 cars—the company with a leased fleet would be about $110,000 profit ahead of the second company using a company-owned fleet. This $100,000 would be cumulative **after-tax** earnings at the end of two years. (An objective analysis

of the different methods of fleet acquisition has been developed by the Foundation for Management Research. It is entitled: "Advantages and Disadvantages of Auto Fleet Leasing: A Comparison of Company Ownership, Salesman Ownership, and Leasing." Single free copies may be obtained by writing to the Foundation at 121 W. Adams St., Chicago 3, Ill.)

How Does Auto Fleet Leasing Work?

There are two basic types of auto fleet leasing plans: the Finance (Equipment Trust) Lease and the Maintenance (Fixed-Cost) Lease.

The Finance Lease: In this plan, Wheels, Inc., for example, provides the auto fleet at special low fleet prices, delivers them to the salesmen in their home territories, and sells the fleet at the end of the (normally, two-year) lease period. For these services, the leasing company charges a monthly leasing fee. To this is added a monthly payment (2% of original cost) covering depreciation. All costs of maintenance are borne by the user. In short, the Finance Lease gives the user a brand-new fleet of cars, and handles the sale of the used cars. Everything else is provided by the user.

However, one of the intangible but strong benefits of this plan is the guidance of the leasing company as to the best type of cars to use for a particular company's business, and the best time of the year to dispose of the used cars. Where the leasing company is a large national concern with years of experience, it can dispose of used fleets in different used car markets throughout the country. At any given day, prices for a given model may be higher in one city than another. A national leasing company keeps abreast of such price situations in order to get the best prices for its clients' used car fleets.

The Maintenance Lease: In this plan, the leasing company not only provides the new fleet, but takes over the whole expense of fleet operations, except for daily gas and oil costs. This includes buying the fleet, delivering it to salesmen in their home territories, all repairs and maintenance work, insurance, licenses, taxes, tires, and selling the fleet. The leasing company also bears all risks of depreciation. For this whole package the leasing company charges a flat monthly fee covering everything—fleet acquisition, maintenance, depreciation, etc. The user has a fixed cost and knows exactly what his fleet operating costs will be. The user is out of the automobile business.

What Are the Advantages of Auto Fleet Leasing?

In addition to conserving a company's working capital, auto fleet leasing offers these advantages:

1. Leasing an auto fleet is a form of financing which does not affect a company's ability to borrow from its normal sources. If a company borrowed to buy an auto fleet, such borrowing would appear as a liability, and affect the company's remaining credit. A leased fleet, however, is not a liability, nor does it affect a company's borrowing power any more than does annual rent for a building.

2. Leasing frees company executives from supervising an auto fleet and enables them to devote their full time to the company's main business.

3. In most situations a leased auto fleet is more economical than other forms of operation.

4. Companies using a Maintenance (Fixed-Cost) Lease can budget transportation costs for 12 or 24 months in advance.

5. A leased car is often an important fringe benefit to offer a company's salesmen or to attract good new salesmen. It eliminates a morale problem where salesmen object to using their own cars on company business.

6. Through leasing, a company's salesmen have latest model cars, well-maintained, which enhance the company's prestige and give its sales force the best transportation available.

7. Autos are delivered directly to salesmen in their home territories and picked up from them at trade-in-time. Salesmen do not lose days trading in their cars.

When is Leasing NOT Advantageous to a Company?

1. A company which has more short-term and long-term capital than it can profitably use in its direct business operations will not find leasing advantageous. After all, why pay a leasing company for use of capital, if the user has spare capital of his own? Occasionally, even such a company will go in for leasing merely because leasing relieves company executives of the administrative burdens of buying and selling cars, and possibly fleet management. The company may find that by leasing, lower prices on new cars and higher prices on used cars may be secured. But if these latter considerations are of no importance, or if the user can accomplish those ends by other means, and if working capital is no problem, there is no point to leasing.

2. A company which pays its salesmen by commission only—without direct reimbursement for the use of their cars—will not find leasing advantageous. However, it is a mistake to think that since the salesman pays for the car out of his pocket, that the company has none of the burden. True, the company does not have to lay out capital to buy a salesman car, but the company does have to pay a commission broad enough to cover cost of car operation. The fact that some companies attempt to pay less than the cost explains the high labor turnover among their salesmen. This increases salesmen training costs. If this is insignificant, the company should stick to salesmen-owned cars.

3. Companies whose salesmen average 1,000 miles per month or less in auto travel, primarily in cities, find it advantageous to reimburse their salesmen on a cents-per-mile basis—but only if the rate is under 10 cents (and the company is indifferent to what the salesmen's cars look like). Where this latter is unimportant and the total cost to the company is under 10¢ per mile, such companies should continue to use salesmen's cars. The Foundation report, mentioned earlier, has some interesting tables on this.

How Does Leasing Compare With Company Ownership of Auto Fleets?

Company-owned auto fleets have been declining since the end of World War II. On the average, only 25 per cent of autos used by industry are in company-owned fleets. In terms of cost, data for most company-owned fleets show an **apparent** lower cost (per mile) than for leased fleets. This is misleading, since companies conveniently overlook the cost of their own capital invested in their own fleets. The cost of capital **is** included in charges made by a leasing company.

As has been pointed out under the topic of rapid growth of fleet-leasing, companies can estimate the cost of using their own capital for purchasing a fleet, by examining the rate of profit they earn on their working capital in their own busi-

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plant installations
prove efficiency of the

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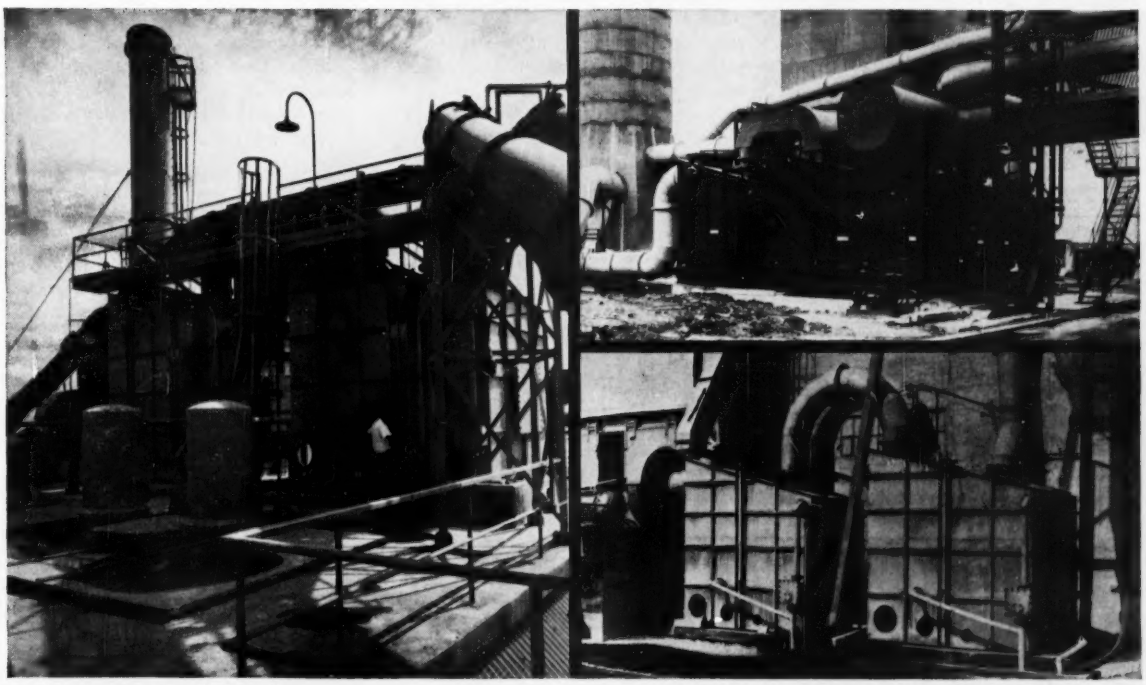

American Cyanamid Co., Brewster, Fla.

Top photo: Scottish Agricultural Industries, Ltd., Leith, Scotland.
Lower photo: Norske Zinkkompani A/S, Odda, Norway.

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The Doyle Scrubber provides a highly efficient yet extremely simple, compact and rugged means for removing solids and fumes from gas streams. It is particularly adapted to fertilizer plant applications, including treatment of waste gases from phosphate fertilizer driers and several other operations. Its versatility is demonstrated in such additional applications as fume control in smelters, treatment of SO_2 gas prior to acid manufacture, ammonia recovery and possible use in fly ash collection.

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nesses. This is what they must pay for use of company capital if they use this working capital and sink it into an auto fleet. It is this realization which is partly responsible for the steady decline of company-owned auto fleets, and the continuous growth of leased fleets.

How Does Leasing Compare with Salesman-Ownership of Auto Fleets?

Many of the companies using salesmen-owned fleets are smaller companies. Salesman-ownership of cars eliminates any company investment in a fleet, which is similar to the advantage offered by leasing.

Most of these salesmen are reimbursed for the use of their cars on a cents-per-mile basis. In the fertilizer manufacturing industry the national average for such payments is 8.76 cents per mile and salesmen average 38,000 miles per year. Except for low-mileage fleets, leasing is normally less expensive.

While saving of company capital is important, salesmen-owned cars have some serious drawbacks. For one thing, if company mileage payment is 7¢ a mile, a salesman-owned car driven more than 23,000 miles a year is more expensive to operate than using a leased car. At 8¢ a mile, a salesman's car driven over 18,000 miles a year is less economical than a leased car. At 9¢ a mile, anything over 17,000 miles is more expensive than leasing.

Many companies with salesmen-owned cars have switched to leased auto fleets because it cut mileage costs. However, companies with low annual mileage per salesman (under 15,000 miles) should show lower mileage costs than under leasing, provided the mileage allowance is under 10¢.

Of course, there may be intangible drawbacks involved in using salesmen-owned cars, which cannot be evaluated in dollars and cents, but which have been considered important by different companies. For example, no matter how generous the mileage payments, the salesman may tend to look upon mileage payments as regular income rather than as cost of operating his car. He doesn't consider that he must lay aside some part of those payments as depreciation cost, to be used in purchasing a new car. As a result, he resents the burden of getting a new car, which poses a morale problem and could create disloyalty.

Making ownership of a late model car a prerequisite for employment limits companies in their choice of good sales personnel. Such companies have to hire only salesmen who own late model cars and are willing to use them on company business. On the other hand, using only salesmen-owned cars does have the advantage of taking a company out of the automobile business, though it undermines company control of such matters as insurance, looks of the car, down-time for repairs and trade-ins. Where salesmen have been offered a choice between driving their own cars with mileage payments, or using a leased or company-owned car, the vast majority of salesmen have elected not to use their own autos.

What Are Recent Trends In Auto Fleet Leasing?

The most recent trend in auto fleet leasing is the Finance (Equipment Trust) Lease, described earlier. This conserves a company's working capital while enabling the company to take advantage of any lower operating costs that may be peculiar to its fleet operation under its own fleet manager.

What Is The Length Of Auto Lease Terms?

Finance Lease terms are generally for two years or more, except where companies have extremely high mileage (50,000 miles per year, for example). The one-year lease is rapidly disappearing because of the high depreciation factor in the first 12 months of an auto's life. Maintenance Leases are often for two years, though some are shorter.

What Happens To The Autos When The Lease Term Is Ended?

They are sold as used cars by the leasing company. In the Maintenance (or Fixed-Cost) Lease, the used car price is of no importance to the lessee because the depreciation has already been covered in the fixed rental payment per month. But in the Finance Lease, the used car price is of extreme importance, since the final cost of the fleet operation will depend on how well the leasing company can dispose of the fleet. Where the selling price is high enough, the user does not have to make up any deficit on depreciation cost. An experienced, national leasing company which sells its fleets throughout the nation can take advantage of the best going markets to dispose of fleets at highest prices. Most clients of such companies do not have to make up any deficiencies if they follow the leasing company's advice on when to sell their used cars.

How Can I Tell If My Company Should Lease Its Auto Fleet?

Each company must examine its own particular situation. If a company can use outside capital in the form of a leased auto fleet and keep its own capital working in the business at a better return, then it pays to lease. To determine this, companies should examine their own returns on net working capital before making a decision. Similarly, if a company is using a salesman-owned fleet, it should examine whether or not this is more costly than leasing and whether salesmen's morale and transportation efficiency could be improved through leasing.

"Tough controls have never been tried — a system that would limit how much farmers could sell, not merely how much they could grow." Butler and Richter in Progressive Farmer.

Liquid and Solid Costs

(Continued from page 30)

per unit of plant food lower than in North Carolina, yet the cost difference between solids and liquids at each location remains about $0.01 per unit.

In developing this cost analysis, we have attempted to utilize conventional equipment, formulations, and practices of the solid and liquid fertilizer industry with only slight modifications where they seemed appropriate. New developments in the fertilizer industry such as the use of wet-process instead of electric-furnace acid in the production of liquid fertilizers could alter the cost situation as presented here. But the use of wet-process acid in liquid fertilizer plants is relatively new to the industry, and we cannot justify its use in conventional formulations at this time.

It is recognized that production and distribution costs are not the only criteria for predicting the future of liquid mixed fertilizers, although they are important ones. The merchandising and convenience aspects are other yardsticks that should be considered in the over-all evaluation of liquid mixed fertilizers in the Southeast.

ACKNOWLEDGMENT—The assistance of John R. Douglas and Julius Silverberg and other members of TVA's Division of Agricultural Relations and of Chemical Development, in the preparation of this report, is gratefully acknowledged.

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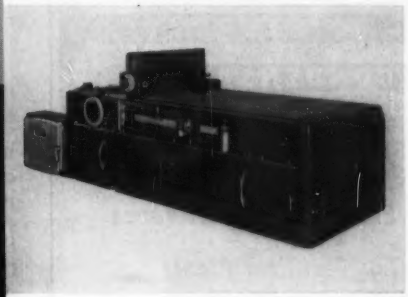
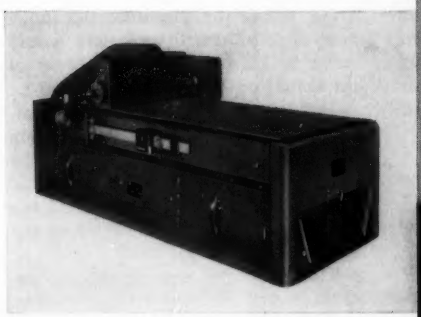
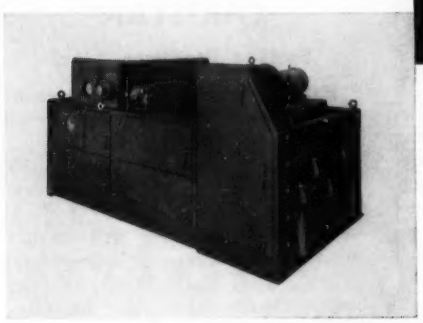




HI-WEIGH (Models 37-20 & 37-42) Weighing Feeders for:

- blending or feeding dry ingredients . . . ammonia, rock dust, solid nitrogen, potash, super, triple-super, etc.



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MODEL 37-20
High Capacity – feed rates of over 3,000 lbs. per min.
High Accuracy – ± 1% by weight of set feed rate within range
Wide Range – provided by 100:1 variable speed transmission
Bulletin – 35-N62

MODEL 37-42P
Extra High Capacity – feed rates to 10,000 lbs. per min.
High Accuracy – ± ½% of max. weight (weigher); ± 1% by weight of set feed rate within range (feeder)
Wide Range – 10:1
Bulletin – 35.20A-1

MODEL 36-20
High Capacity – 0 to 10, 100, 500, 1000, 2000, 3000 lbs. per min.
High Accuracy – ± ½% of maximum rate
Wide Range – 10:1 (constant speed drive); 50:1 (variable speed drive)
Bulletin – 36-P1

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International Scene

AUSTRIA

Big shipment due for India

A leading Austrian chemical concern which for four years has carried out an agronomic instruction campaign in India, recently concluded a skeleton agreement in cooperation with two German enterprises and one Norwegian firm, envisaging deliveries of nitrogen fertilizer to India to an annual value of two million pounds. The four supplier firms will share among themselves the contractual shipment volume of 120,000 tons of fertilizer.

CANADA

Could supply Potash for all

The potash reserves in Saskatchewan are so great it is said they could supply the entire North American continent for the next 2000 years, at current demand. Recoverable reserves are estimated at 4,000,000,000 tons.

Mining costs there are higher than in New Mexico, but it is reported that the quality of the mineral may offset this disadvantage.

CEYLON

Fertilizer plant for 1963

The Ten-Year Plan provides for the establishment of a fertiliser plant which is expected to come into operation in 1963. The project which may involve the largest expenditure on an individual plant is that proposed for producing ammonium sulphate. It will use the crude oil-cracking process.

Ceylon will be consuming 40,000 tons of nitrogen in 1963 and 80,000 tons in 1968. Ceylon's domestic needs of ammonium sulphate in 1963 will be 200,000 tons. Development thereafter will depend upon the verdict of the soil chemist whether nitrogen should be applied to the soil in the form of ammonium sulphate, ammonium phosphate or urea.

KOREA

Tax-exempt fertilizer plan

The Finance Ministry is preparing a legislative proposal to exempt Government-distributed fertilizer from foreign exchange tax so that such fertilizer can continuously be supplied to farmers at the prices prevailing before the adoption of the new exchange rate of 650 hwan to $1.

Aid-imported fertilizer distributed through Government agencies had been priced at a conversion rate of 650 hwan to $1, with the minimum exchange tax levied at the rate of 150 hwan to $1, which was worth 500 hwan at the old official rate.

If the minimum exchange tax were added to the new exchange rate of 650-1, fertilizer prices would have to be priced on the basis of an actual conversion rate of 800-1.

Prices of Government-distributed fertilizer are subject to approval by the National Assembly. If the tax exemption measure is approved by the Assembly, the current fertilizer price list would be continuously in effect.

The proposed elimination of exchange tax on fertilizer, however, would reduce Government revenue by about six billion hwan annually.

No new aid funds have been made available yet for Governmental fertilizer import since the exchange rate switchover.

PAKISTAN

Seeking Fertilizer, Steel

Pakistani trade officials have come to Italy to negotiate the purchase of fertilizer and farm insecticides.

Their aim was to buy about 7.5 million rupees worth of insecticides, pesticides and fertilizers.

While in Italy they will contact the major producers, including Montecatini, Anic and Edison, and then will probably leave Italy for Germany and Holland.

Agreements were concluded in Karachi recently for the purchase of 10,000 tons of sulfate of ammonia from the Anic company and a further 10,000 tons from East Germany.

Fertilizers, aluminum and steel worth about seven million dollars will shortly be supplied by Canada to Pakistan under an aid agreement for the year 1959-60.

This was stated in Karachi by the outgoing Canadian High Commissioner, H. O. Moran.

In an interview the gentle-mannered, well-liked Mr. Moran voiced his admiration for the energy and vigour with which some of the "fundamental problems" were now being sought to be solved in Pakistan.

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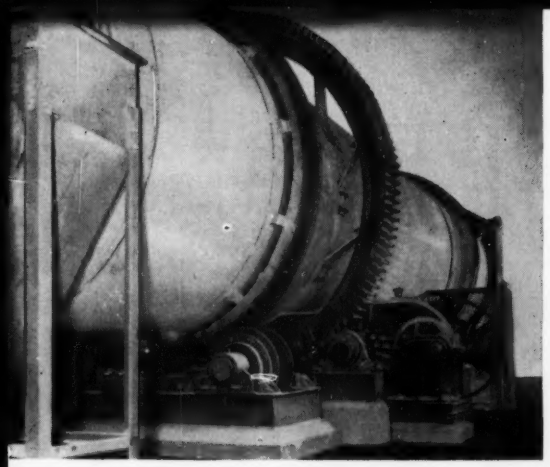

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Assure maximum product reclamation from your oversize through impact-cracking action, producing minimum of fines.

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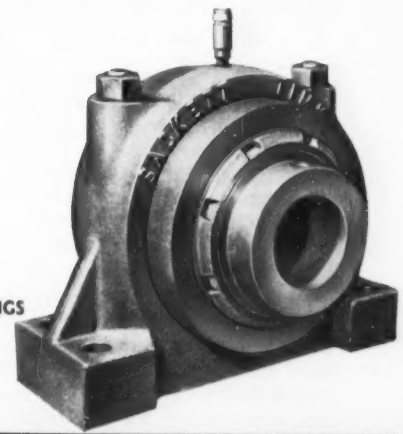
Streamline your blending operations with Sackett Patent Gravity Mixers. Give you fast accurate mixing without power.



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Rugged rotary machines accommodating T.V.A. principle of ammoniation and granulation.

STAR GRANULATORS
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America foremost Creative Designers And Builders Of

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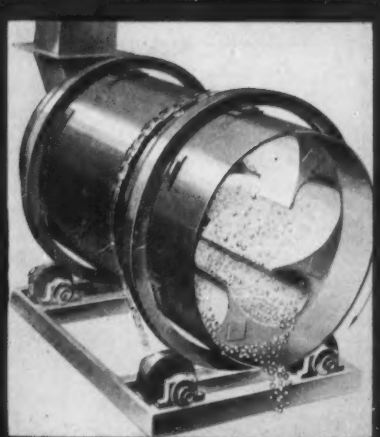
•
SUPERPHOSPHATE PLANTS
•
RELATED PRODUCTION EQUIPMENT



PEOPLE in the Industry

Royster

F. S. Royster Jr., son of the 1885 founder of F. S. Royster Guano Co., has been elected chairman of the board of directors.

Royster

Mr. Royster succeeds C. F. Burroughs Sr., who died February 24. Charles F. Burroughs Jr. remains president of the fertilizer manufacturing firm with headquarters in Norfolk.

Mr. Royster, who has been a vice president and director of the company, has continuous service with the fertilizer firm since January 1, 1914.

In addition to his interest in the fertilizer firm, Mr. Royster operates the 12-story Royster Building, a landmark of downtown Norfolk.

American Cyanamid

Roy A. Marriott has been appointed manager of sales training for the Agricultural Division of American Cyanamid Company, it was announced by Burton F. Bowman, divisional marketing director. Previous to his new assignment, Mr. Marriott served as sales coordinator for the Division.

Mr. Bowman also announced the appointment of Omar L. Patton to district manager of the Denver district in the Western region. Mr. Patton will replace Howard M. Geddes, who is returning to Canada to be associated with Cyanamid of Canada Limited. These changes were effective May 1.

Southwest Potash

J. Stanley Mitchell, formerly with Calera Mining and Nickel Processing, is now superintendent of the Southwest Potash mill at Carlsbad.

Richardson

The appointment of John Kenyon as St. Louis district manager has been announced by Richardson Scale Co. Mr. Kenyon was a sales engineer working out of Richardson's St. Louis office. He has been with the firm for 13 years.

Address of the St. Louis office is: P. O. Box 3871 (623 Norfolk Dr.), Kirkwood 22, Mo. (Telephone: Yorktown 5-8444).

Nitrogen Division

Nelson

Caldwell

Richard L. Nelson has been appointed a sales representative for Allied Chemical's Nitrogen Division. He will supervise the northern Illinois sales territory.

Harold W. Caldwell has joined the Nitrogen Division as a sales trainee in the Indianapolis, Indiana district.

AP&C

T. A. Jonas has been appointed manager, Washington Office for American Potash & Chemical Corporation, it was announced by G. S. Wheaton, vice president, Defense Programs.

Mr. Jonas, who moves up from the post of Washington representative, will maintain local business contacts for the firm's National Northern Division in addition to representing the company with governmental agencies, replacing J. S. Murray who resigned to enter business as an independent consultant, in which capacity he will continue to perform services for the company.

Martin

The Martin Engineering Company, manufacturers of vibration inducers in Neponset, Illinois announces that Randolph L. Ruhley of West Hartford, Conn. has joined their company as field manager of sales and development. Mr. Ruhley, former vice president and general sales manager of the Branford Company, New Britain, Connecticut has sold his interest in that company and resigned to accept this new position with Martin.

Olin Mathieson

Harold A. Ford has been named manager of nitrogen products, O M's chemical division. Out of Baltimore headquarters he will coordinate all nitrogen products marketing of the division. He joined them in 1956.

West Virginia P&P

West Virginia Pulp and Paper Company has named Kenneth W. Glazebrook as New York district sales manager for multiwall products, it has been announced by Victor S. Luke, division manager. He succeeds James A. Mundie who is now staff assistant to Sheldon Y. Carnes, northern region manager.

Glazebrook

The New York district sales office serves industrial and consumer accounts in New York, New England, Pennsylvania and Delaware.

Joining West Virginia Pulp and Paper in 1957, he was previously with the Denison Manufacturing Co.

Monsanto

Charles H. Sommer has been elected president of Monsanto Chemical Company and Charles Allen Thomas was elected chairman of the board of directors.

Mr. Thomas had been president, and Mr. Sommer had been executive vice president.

The board also elected Mr. Sommer chairman of the executive committee and a member of the finance committee.

Edgar M. Queeny was re-elected chairman of the Finance Committee. He also remains a board member and a member of the Executive Committee.

All other officers were re-elected.

Hayes-Sammons

Hayes-Sammons Chemical Co., Mission, Texas, has announced the promotion of two long-time employees, A. N. "Andy" White and Harold W. Dube, according to Clay Brazeal, vice-president.

Mr. White has been named general sales manager of all Hayes-Sammons companies. Mr. Dube becomes general manager of the Dixie division at Indianola, Mississippi, replacing Mr. White.

Mr. White joined Hayes-Sammons in February, 1953; Mr. Dube has been with them since 1955.

Allied

George A. Benington, vice president—advertising and trade relations—Allied Chemical Corporation, will retire in April after a career of 47 years in industry.

Mr. Benington was employed by W. R. Grace & Company from 1913 to 1923, when he joined the Bowker Chemical Company, a subsidiary of American Agricultural Chemical Company, as vice president. He later became assistant to the president and vice president of American Agricultural Chemical.

In 1933 Mr. Benington joined Mutual Chemical Company. In 1943 he was named president. He served in that capacity until Mutual was acquired by Allied Chemical in 1954, and then was president of the Mutual Division until it became a part of Solvay Process Division. He was named Allied Chemical vice president—marketing—in 1957.

Balfour, Guthrie

Harold E. Ferguson, vice president in charge of the fertilizer division, has been elected to the board of directors and appointed a senior vice president of Balfour, Guthrie & Co., Ltd., San Francisco, effective April 1, 1960.

Velsicol

Velsicol Chemical Corporation announced the appointments of Chris P. Gicas and Louis H. Mehalek to the company's growing Chlordane insecticide marketing staff. Mr. Gicas will cover Florida, Georgia, Alabama, North Carolina and South Carolina.

Mr. Mehalek is responsible for Ohio and Michigan.

Emil F. Bless has been appointed sales representative for the agricultural chemicals division,

US Borax

Appointment of George L. Oppel as director of production for United States Borax & Chemical Corporation is announced by Robert T. Edgar, vice president in charge of the production department.

Mr. Oppel, who will be headquartered in Los Angeles, was associated with American Cyanamid Co. from 1947 until recently except for two years spent with Greer Engineering Associates.

Dr. Irving S. Bengelsdorf as a senior scientist for the U. S. Borax Research Corporation is announced by Dr. C. L. Randolph, vice president of the Anaheim (Calif.) subsidiary.

CHANGES AT AGRICO

Roy Simm, manager of The A.A.C. Company's engineering division, after 45 years service with the Company, and R. M. Rodger, a 42 year veteran, have retired.

Robert D. Weldon has been named manager, turf and garden fertilizer sales, it has been announced by W. J. Turbeville, Jr., vice-president in charge of fertilizer sales for The American Agricultural Chemical Company.

Weldon

Mr. Weldon has broad experience in sales and marketing, including several years in the turf and garden field.

J. D. DeHaan has been assigned to the headquarters staff at the New York office to assist in coordinating sales promotion and training under sales manager R. L. Waring, Jr. He has served since 1954 as regional agronomist.

Leonard Engel, former assistant purchasing manager, has been named manager, purchasing department, by C. M. Powell, company president.

Mr. Engel joined Agrico in 1914. Irving C. Keller, a member of the purchasing department since 1937, has been named assistant manager.

George J. Wilson has joined the administrative staff as legal counsel. Mr. Wilson, who has degrees in law and engineering, will provide legal assistance in conjunction with the company's administrative activities.

Vice-president D. S. Parham presents watch to Roy Simm, right, on his retirement from Agrico's engineering department.

General Superintendent R. M. Richey presents gift to R. M. Rodger, right, his assistant, on his retirement.

Walter Bartz, formerly accountant at the Pierce, Florida, phosphate rock mines, has moved to the New York offices, as special assistant to comptroller W. H. Hildebrandt. J. M. Grant has been appointed accountant at Pierce.

Norman F. Spencer has been named a regional agronomist and will be located at the Fulton, Ill. office, it has been announced by Dr. D. P. Satchell, head of agronomic services. Mr. Spencer replaces J. D. DeHaan, now director of sales promotion and training.

DeHaan

Engel

Keller

Spencer

Specialty Machine

W. W. 'Woody' Phillips has joined the staff of The Specialty Machine Company as vice president and general manager. Mr. Phillips, formerly associated with one of the leading fertilizer plant design and construction engineering firms, announces that Specialty Machine is presently engaged in fertilizer plant design as well as process equipment such as rotary dryers and coolers, TVA-type ammoniators, and material handling systems.

The staff handles all phases of engineering—civil, mechanical, structural and electrical—he states, and their fabricating faciilties handle up to one inch carbon steel and three-quarter inch stainless as well as other alloys, including aluminum.

Specialty Machine is located on

Red Comb Drive in Cartersville, Ga. The telephone is EVergreen 2-1221 in Cartersville, or Atlanta phone JAckson 3-1225.

Woodward & Dickerson

Formal announcement has been made by Woodward & Dickerson, Philadelphia, of the appointment of H. A. C. Rauchfuss as board chairman and C. Earl Gettinger as president. The concern has been operating in Philadelphia for 87 years.

Lummus

The election of Maurice E. Brooks, George R. Collins and Ralph E. Wise as vice presidents of The Lummus Company was announced by James F. Thornton, president.

Mr. Brooks is director of engineering, who joined the company in 1940. Mr. Collins is director of construction. He joined Lummus in 1935. Mr. Wise joined them in 1945, and in 1959 was elected vice president of The Lummus Company, Canada Limited.

Armour

Richard C. Parsons has been added to the fertilizer sales staff of Armour Agricultural Chemical Co. He will be Syracuse warehouse salesman under the supervision of Glenn Waterman.

C. M. Smith Develops Formula For Sleep

C. M. Smith, retired (after 41 years) manager of Southern Cotton Oil plant at Little Rock, Ark., has developed a formula for sleep that should be of wide interest, especially among his many friends in the fertilizer industry — (It's a shame you didn't know about this those sleepless nights before the season started!)

About 12 years ago Mr. Smith suffered a near-nervous breakdown from overwork and his inability to sleep. More than 10 years ago he devised a formula for the relief of physical and mental fatigue, "tension headache," high nervous tension and insomnia. The formula was so effective in the alleviation of these conditions that he believes it can help many others. He has had his formula copyrighted and has decided to place it on the market for the benefit of the general public.

The copyrighted formula, which is called "Smith Sleep Formula—the Secret of Good Health," may be obtained by sending your printed name and address, with $1 for each

copy desired to Smith Sleep Formula, P. O. Box 3302, Forest Park Station, Little Rock, Ark.

HONORS

Dr. R. C. Buckner

Dr. R. C. Buckner, University of Kentucky Agricultural Experiment Station agronomist assigned to the Crops Research Division of the United States Department of Agriculture, has been honored by the federal group.

He received a $300 prize and a rating of "outstanding" for his work with pasture grasses and specifically for his achievements in a research project to cross rye grass with tall fescue.

Sugar Beet

Five sugar beet growers, all from Mesa County, Colorado, will be honored on May 3 when production achievement awards are made to them by the National Plant Food Institute in cooperation with Colorado State University. All five are new members of the "10,000 Pound Beet Sugar Club."

8 X 4-H

For the eighth consecutive year the Plant Food Division of Olin Mathieson Chemical Corp. will honor eight "graduates" of 4-H Club work. At the 39th National 4-H Club Congress in Chicago next December they will receive gold alumni keys —given each year to eight former 4-H'ers who have "continued to live by 4-H ideals."

The 4-H Alumni Recognition program, conducted nationally by the Cooperative Extension Service, is supported by Mathieson.

Samuel L. Nevins of Little Rock, Ark., a Mathieson v-p, is a member of the committee. He has long been interested in youth work, and for several years has concentrated his efforts in developing the scope of the 4-H Alumni program.

Ohio State's soil testing lab can tell when Spring is near by the way business picks up.

• • •

In India they are having trouble with fraudulent distribution of fertilizers. Somebody has found out how to make liquor out of fertilizer. That's a short-cut instead of fertilizing corn!

ARKANSAS

Planters Fertilizer & Soybean Company, Pine Bluff, suffered considerable damage to their granular fertilizer plant in a fire April 14. Manager George H. Dunklin reports that two exploding gasoline storage tanks set the storage section of the fertilizer unit ablaze, razing it to the ground. Flames reached the fertilizer processing section, but damage to equipment there was only moderate.

ARIZONA

Grow Best Fertilizer Co., Phoenix, has new owners: F. V. Jensen, Joseph C. Metzguer, Walter Barber and Bernard Ross.

* * *

Tri-State Enterprises, Casa Grande, has been established by T. T. Wynne to deal in fertilizers.

CALIFORNIA

United States Borax & Chemical will install a 1300-foot mechanized conveyor system to provide increased flexibility in meeting future ore demands and reduce the cost of transporting borate ores from the bottom of its huge open-pit mine at Boron to its surface plants, it was revealed by James M. Gerstley, president of the firm, who said this major project is scheduled for completion by Fall.

Trucks currently haul the ore from the bottom of the pit to a surface ore crusher, traveling a distance of 2½ miles. The pit measures 2000 feet long, 1700 feet wide and 275 feet deep.

The continuous-belt operation, rising 315 feet to the surface, will replace more expensive haulage to the company's adjacent plants. An ore belt conveyor system has been envisioned for the open-pit mine whenever the productive area had been developed enough to allow a permanent and economic installation.

The company's open-pit mining operation, begun in 1956 while the $20,000,000 processing plants were being constructed, lies almost directly beneath the still visible tracks of the twenty-mule teams that hauled borax from Death Valley to the railroad at Mojave during the 1880s.

Mr. Gerstley said the unique sodium borate deposits at Boron commercially proved in 1925, are the largest and richest in the world with reserves estimated to last in excess of 100 years at current production rates.

FLORIDA

Virginia-Carolina plants under way, all in Florida, run to some $12,000,000. As we pointed out last month, the new 16-48-0 diammonium phosphate plant at Nichols, to cost more than a million, and to be ready in the Fall, is to supply the two other new plants in process of construction. The design, engineering and construction are in the hands of Wellman-Lord Engineering, and output is scheduled to be 100,000 annual tons.

Due to be ready next month is the $10,000,000 expansion of the concentrated superphosphate plant, whose capacity is thus trebled. At Clear Springs, just below Bartow, V. C. is putting more than a million into its new phosphate rock flotation plant.

* * *

Air Reduction's new plant at Tampa, for which ground was recently broken will produce liquid nitrogen as well as other products of liquid-air separation. It is expected that the Tampa site will eventually become a center for other Air Reduction facilities.

GEORGIA

Stevens Industries will continue operation of the Southern Cotton Oil fertilizer plant at Dawson, which it recently acquired. Plans call for modernization of the plant to increase speed of throughput, according to Geise Dozier, executive vice president. This means that Stevens will now be operating two fertilizer manufacturing facilities in Dawson.

Machinery from the shut-down Southern Cotton Oil fertilizer plant at Fort Gaines has been moved to the fertilizer plant which Stevens already operated at Dawson. Addition of this equipment has doubled capacity of the plant, and also allows them to carry on mixing and bulk load-out operations simultaneously.

ILLINOIS

Allied Chemical's General Chemical division has announced plans to build at East St. Louis a wet process phosphoric acid plant planned to produce 50,000 annual tons by early next year, according to president Frank J. French. General Chemical, which also produces sulphuric acid, has 40 US plants.

* * *

National Phosphate Corp. president Erol Beker has announced for immediate construction at Marseilles a phosphoric acid plant which is said to be engineered for the highest capacity in the mid West. It should be ready by the end of this year, in time for the 60-61 season.

Every known development in the production of phosphoric acid and its handling has been incorporated in this most modern plant. Customers will be served by truck, rail and barge—the plant having its own deep water dock, with extensive loading and unloading equipment, mainline rail service with spurs to the plant, and good highways.

The plans include production of phosphoric acid derivatives used by various industries.

* * *

E Z Liquid Spread Fertilizer will soon be ready for the grand opening of their Ogden plant, which will supply liquid fertilizer.

IOWA

Ke-Wash Fertilizer, Keota, has given us added information on the roundhouse they bought at Belle Plaine (See Map, March) to supplement their Keota plant. Facilities include belt conveyors, Payloaders, hopper-bottom loading equipment, with bagging equipment on the way. The warehouse has 6000 ton capacity and contains both bag and bulk goods.

The bag that's safer...stronger...re-usable, too!

Want *important* savings? Use burlap. You save on space, because burlap bags stack higher. You save on waste...burlap keeps breakage down. You save on handling costs...only burlap can take on 200 pound loads. You save on the bags themselves...burlap is re-usable. And another big plus...the farmer likes burlap. *He* asks for it. You should too.

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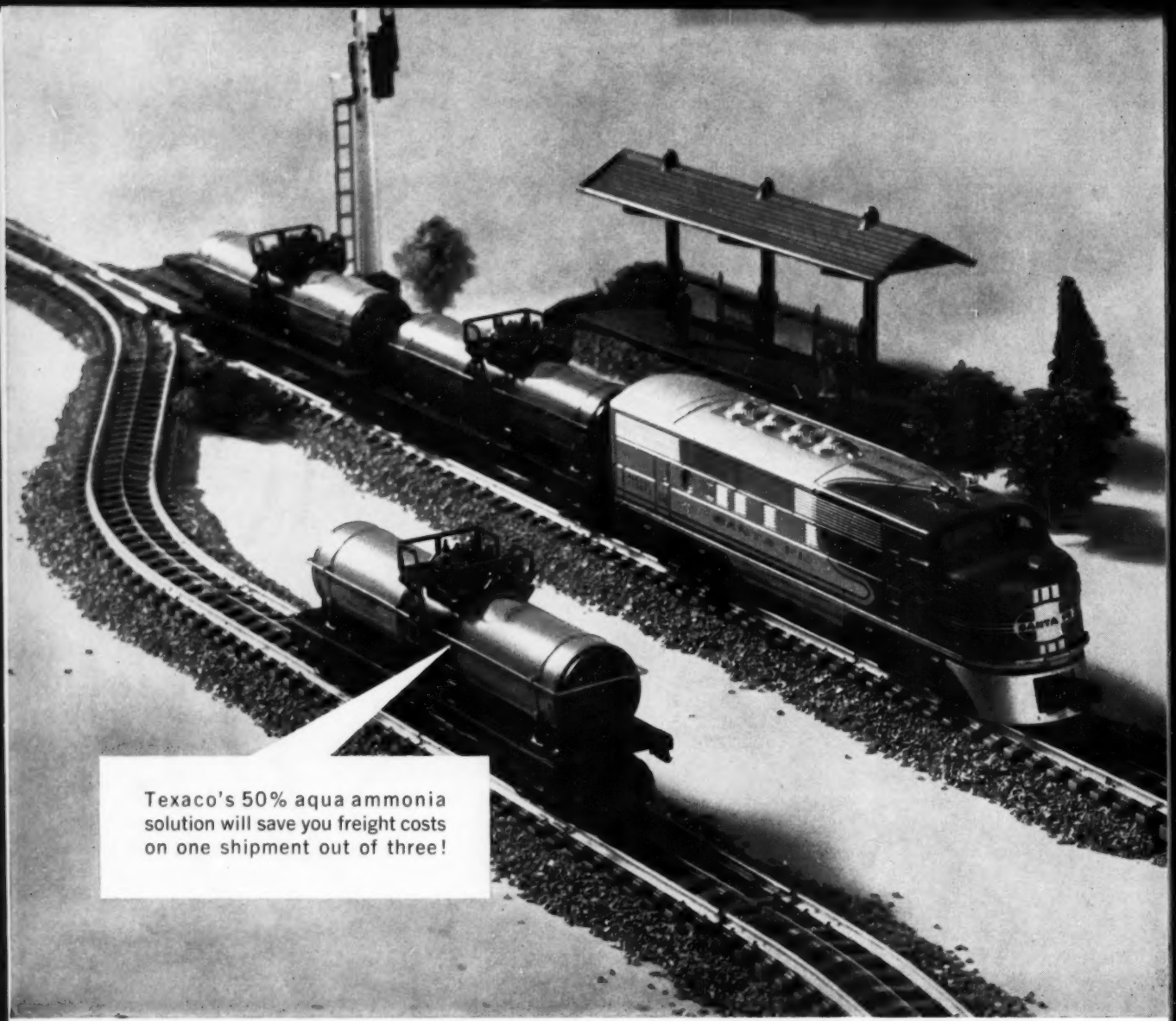


Don't pay freight on water when you buy ammonia!

When you buy Texaco's new 50% aqua ammonia solution instead of the standard 29.4% solution you get the equivalent of free freight charges on one shipment out of three!

Texaco's new 50% NH_3 solution gives you *57% more ammonia* than the same volume of regular 29.4% solution. You save shipping costs on one tank car out of three.

When 50% solution arrives at your plant, you can dilute it to 29.4% without additional investment in handling equipment.

Only Texaco offers you this saving! For more information on this ammonia solution or any other high-quality Texaco petrochemical, call or write Texaco Inc., *Petrochemical Sales Division,* 332 South Michigan Avenue, Chicago, Ill., or 135 East 42nd Street, New York 17, New York.

Tune In: Texaco Huntley-Brinkley Report, Mon. Through Fri.-NBC-TV

TEXACO

TEXACO PETROCHEMICALS

TEXACO PETROCHEMICALS: Aqua ammonia, anhydrous ammonia, nitrogen solutions, diisobutylene, odorless mineral spirits, naphthenic acid, propylene tetramer and rust inhibitors.

KENTUCKY

Gro-Green Chemical Co., Inc. has been incorporated with Shelbyville headquarters, to manufacture and deal in fertilizers, agricultural machinery and supplies, by Leban P. Jackson, William Hopkins and Robert N. Cleveland.

MISSOURI

Tri-State Chemical facilities at Webb City have been purchased by Darling & Co., Chicago. George M. Babb has been appointed local plant manager, under the supervision of H. L. Stangel, Darling manager. Local personnel will be used. This is the fifth plant in the Darling fertilizer division. The concern dates back to 1882, and their goods are sold as "Darling's Pelleted Soil Builders."

• • •

Consumers Cooperative, Kansas City, is establishing four new fertilizer service centers, each designed to serve the cooperatives and their members in a radius of 40 miles. At each center an agronomist manager will work with the local people, taking soil samples and tailor-making grades suitable to the soil and approved by the Land Grant colleges.

Each center will, of course, stock the basic NPK from which the custom goods will be mixed. Bagged material will be available in conventional grades, but no bulk fertilizer will be sold in these grades.

Cleve McCarty will be responsible for the four centers, assisted by Al Manis, Jr. The centers are located at Mead, Colorado; Ida Grove, Iowa; Clinton, Missouri and Grand Island, Nebraska.

OKLAHOMA

Farmers Fertilizer Company of Texarkana, Texas has purchased the 20-hourly-tons granulating plant formerly operated by Nichols Fertilizer & Chemical Company at Oklahoma City. President Harold J. Trammell reports that some plant modifications — principally re-arrangement of equipment—will be completed during the summer and the plant will be ready to go into production again early next fall.

NEW JERSEY

Koppers' Gas & Coke Division is ready to produce ammonium sulfate, at the rate of about 10,000 annual tons, at the Kearny plant. This facility had been producing monoammonium phosphate for Monsanto, —the contract for which has expired. The Kearny plant's new product will be marketed for fertilizer use by Nitrogen Products, Inc., New Brunswick.

PENNSYLVANIA

Alco Oil & Chemical, Philadelphia, have developed Vulcanol, a spray for mulching roadsides and similar areas. It is said to stay in place long enough for the seeds to germinate, and be applied with standard spray equipment.

TENNESSEE

Tennessee Corp. is doubling the liquid sulphur dioxide capacity of its Copper Hill facility, at a cost of $1,000,000.

TEXAS

Texas Gulf Sulphur, starting up its $3,000,000 Beaumont plant is at the same time planning to close down the sulphur unit at Galveston by the end of the year. The new Beaumont docks permit handling of both dry and molten sulphur, and TGS plans seem to be headed for concentration of facilities at Beaumont. Galveston sulphur shipments have been a 14% share of the world total of 13,000,000 annual tons.

UTAH

San Francisco Chemical has supplied added details of the phosphate operation at Vernal, reported here last month.

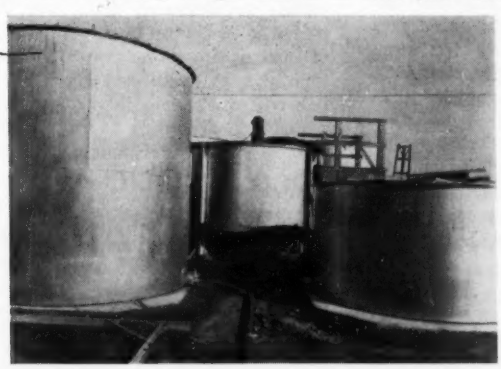
Plans call for the construction of a major phosphate rock crushing and benefeciation plant to be designed by Western Knapp Engineering Company. Construction work will begin this month and is scheduled for completion by November.

Operations will be based on San Francisco Chemical's phosphate rock deposits at Vernal. Initial output of the new crushing and benefeciation plant will be 200,000 tons of phosphorite concentrate annually.

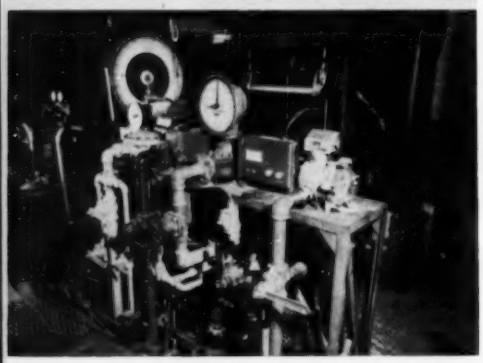
This concentrate will be trucked 200 miles to Western Phosphates Inc. at Garfield, as raw material for the production of wet process phosphoric acid, treble superphosphate and ammonium phosphates.

As our readers know, Western Phosphates Inc. is owned by Stauffer Chemical Company (50%), American Smelting and Refining Company (25%), and Kennecott Copper Corporation (25%).

Left: Flexi-Liners, balloon-type tank liners, used at Chemical Fertilizer Co., Modesto, Cal. General manager Ray Baker reports number one has been used interchangeably for 75% phosphoric acid, 40% nitrogen solutions and 20% nitrogen solutions for seven years—though priced for a life expectancy of only 4 years—and is still flexible and lively, showing no apparent effects from this exposure. **Right:** 40 hourly ton fertilizer granulating plant designed and built by the D. M. Weatherly Co. for Cotton Producers Association, Cordele, Ga.



TEXAS' GOOD PASTURE PLANT WAS EARLY LIQUID FERTILIZER UNIT



Top: Goodpasture Grain & Milling Co. fertilizer plant at Brownfield, Texas, producing 25 TPH on 54% wet process P_2O_5. **Bottom:** Typical instrumentation for Carlile wet process complex fertilizer plant.

Goodpasture Grain and Milling Company at Brownfield, Texas was probably the first high-capacity liquid fertilizer plant in the world designed around the use of 54% wet-process phosphoric acid.

Constructed in February, 1959, the production unit is geared for 25 tons hourly of 8-24-0 solution, and the firm produced and distributed some 20,000 tons of liquid formulations in the initial year of operation. Grades made at the plant, in addition to the 8-24-0 solution, include 10-10-5, 4-10-10 and 10-15-15.

The plant was designed and built by J. C. Carlile Corporation of Denver, Colorado. Carlile engineers had cooperated in earlier work with wet process acid in liquid formulations at West Kentucky Liquid Fertilizer Company, Hopkinsville, Ky.

The Carlile organization states that other plants built by them have been in operation over a 12-month period using only wet process acid, and that the plants will operate on any acid or combination of acids, as well as the new TVA clay-suspension liquid fertilizers.

A still newer plant design, they state, produces liquid formulas in a wide range from 8-24-0 to the conventional complete solutions produced at the Texas facility, but utilizes wet process acid from the phosphoric acid plant run filtration stage running approximately 30% P_2O_5, further lowering the cost of liquid fertilizer formulas.

CANADA

Swift Canadian has bought a site near Thamesville, Ont. and has started construction of a plant food facility, plus warehousing of other crop chemicals. Provision has been made for expansion.

* * *

Canadian Industries Ltd. have awarded contract for the caustic potash plant at their Cornwall works to Fraser Brace Engineering, and construction was scheduled to start April 18. The plant is to cost around $500,000, and is a concrete, brick and steel structure one side of which will be tied in to the present plant's caustic-chlorine cell room.

* * *

Brockville Chemicals Ltd. has awarded to Power-Gas Canada Ltd. the contract for design, construction and commissioning of a plant at Maitland, Ont. The facility is planned to produce 15,000,000 daily cubic feet of hydrogen, which will be largely used for ammonia synthesis. Estimated at $1,800,000, the plant is slated for early 1961 completion.

As our readers know, Brockville is a newly formed concern, whose largest single shareholder is Sogemines Ltd.

* * *

Consolidated Mining & Smelting expects to complete by the middle of this year the 100 daily ton urea plant building at Calgary, Alta. which will use the Inventa-Vulcan process.

* * *

Jefferson Lake is planning two new sulphur-recovery plants—one near Calgary, to be ready by November; the second in the Savanna Creek area.

COLOMBIA

International Petroleum plans a $12,200,000 plant in Cartagena which is planned for 300 daily tons of ammonia and 150 of nitric acid. A new company has been set up to forward this project and to engage in others. It is known as Cia. Organizadora de Industrias de Abonos y Productos Quimicos Ltda.

EGYPT

Badische Anilin & Soda-Fabrik's Aswan nitrogen fertilizer installation is progressing well. The first of three units should be ready to operate late this year. As part of the operation West Germany's Demag-Electro metallurgie is building a huge water electrolysis plant.

INDIA

The Government has announced three superphosphate plants in Madras at Cuddalore, Coimbatore and the plant at Ennore which has already been reported here, being built for East Indian Distilleries.

IRAN

E. N. S. A. of France has signed Societe Belge de l'Azote et des Products Chimiques de Marly to collaborate on the construction of the nitrate fertilizer plant at Shiraz.

KOREA

Honam Fertilizer Company is seeking a loan of 2,500,000,000 hwan to finance construction of the multi-million dollar Najoo Urea fertilizer plant. It is expected that the government of Korea will lend this money, needed because share subscription collections have been running slow.

NETHERLANDS

Albatros Sulphuric Acid and Chemical Works, Vlaardingen, has awarded contracts to Chemical Construction for two plants—one a sulphuric acid contact plant with capacity of 100,000 annual metric tons; the other to decompose sulphuric acid sludge from an adjacent Shell refinery.

PUERTO RICO

Kiabab Uranium has moved its offices to Oakland, Cal., and has joined with Guano Development Co. of Puerto Rico which controls 60,000 tons of high grade bat guano. Kiabab will work on both recovery and packaging, according to its recently elected president, Ralph E. Gillette.

TOGO REPUBLIC

Compagnie Togolaise des Mines du Benin has under construction preliminary facilities for a 750,000 annual ton phosphate mine. A Franco-American group is doing the work. It consists of Societes De Long (US) and Hersent (France).

Bagpak Pallet by International Paper

These tough pallets still do their job after long-haul shipment and months of snow and freezing temperatures.

Trial by weather!

International Paper Bagpak® Pallets survive prolonged storage in snow and severe winter weather with no damage to multiwall bags.

WE DON'T recommend storing Bagpak Pallets in the snow. But when one of our up-state New York customers did, he learned the meaning of *real* protection.

The pallets in our photograph, travel-worn and weather-beaten but still completely serviceable, survived the rigors of shipment, *plus* exposure to winter weather for several months! When they were opened, *every* multiwall bag was safe and uniform. And ready to do its job—no matter how tough.

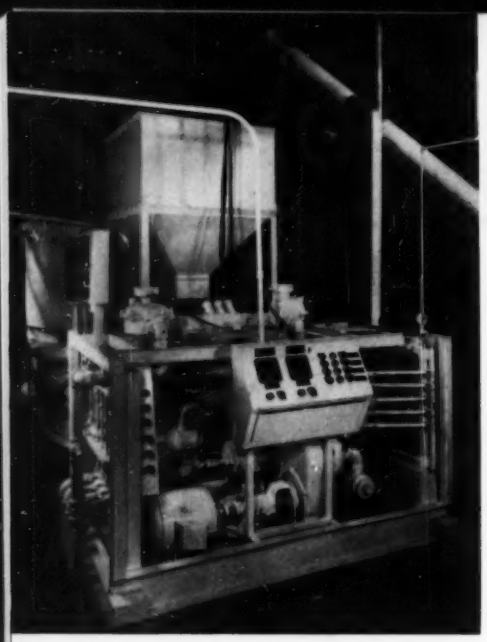
International Paper pioneered this method of shipping and handling multiwalls. Our pallets now have *four* years of on-the-job experience.

And the Bagpak Pallet has a rigid construction that eliminates transit damage due to abrasion. Plus a square design that means a big saving in storage area.

Sixty-two years of papermaking and materials-handling experience are compressed into every Bagpak Pallet. And these rugged pallets are only part of a *complete* multiwall packaging service offered to you by International Paper – world's most experienced papermaker.

Whatever your multiwall packaging needs, you will find it profitable to talk to your Bagpak packaging engineer. He has complete information. It's yours for the asking.

Bagpak Division INTERNATIONAL PAPER New York 17, N.Y.



FREE LITERATURE ON EQUIPMENT MATERIALS AND SUPPLIES

Liquid Fertilizer Unit

Standard Steel Manufacturing Company is offering a two-color, four-page folder describing their liquid fertilizer manufacturing and blending unit. The presentation fully describes their equipment, with schematic diagrams and dimensions.

For a free copy of this folder, circle number 1 on CF's Information Service Bureau card, page 51.

Agricultural Spray Hose Data

Literature detailing the complete line of agricultural spray hose is now available from Swan Rubber Company.

Types of agricultural spray hose described in the new literature include low pressure, medium pressure, high pressure, and hand spray. Pertinent information on applications, cover, reinforcement, tube, lengths, packaging and recommended couplings is outlined with each hose illustration. Special reference sections illustrating and describing various agricultural hose couplings plus Swan's modern manufacturing facilities are also included.

Copies of the new literature may be obtained without charge by circling number 2 on CF's Information Service Bureau card, page 51.

Pneumatic Signal Converter

Brooks Rotameter Company has announced a new pneumatic signal converter, Model 850, designed mainly to convert the transmitted signals from square root flowmeters into linear signals. This permits use of receivers with evenly graduated charts or linear ratioing controllers. The Model 850 has innumerable applications in addition to its use as a square root extracting relay. Actually, it can be used to convert any pneumatic signal into a corresponding output signal of different characterization.

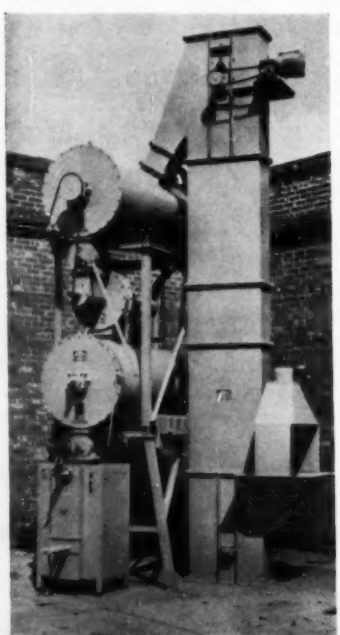
For complete specifications given in Design Specification Sheet #DS 850, circle number 3 on CF's Information Service Bureau card, page 51.

Dry Blending Unit

Aimed at putting fertilizer mixers into the insecticide business is a new dry insecticide blending unit being introduced by Lowndes Engineering Company. The equipment features a double blending action. The upper blender—into which preweighed concentrates and diluents are fed by an elevator—is a double reverse type ribbon mixer; the material passes from here into an attrition mill to break up agglomerrates (the attrition mill is an optional feature) before entering the lower blender, which is the same type as the upper one.

The bottom blender discharges directly into a valve packer. Capacity of the equipment is 3½ to 5 tons an hour. It occupies 10 x 10 feet floor area and 17½ feet vertically.

For additional information on this dry blending unit, circle Number 4 on CF's Information Service Bureau card, page 51.

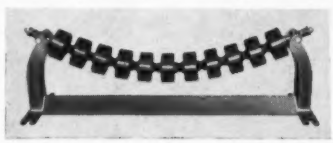


Catenary Conveyor Carrier

Stephens-Adamson engineers have developed a new catenary conveyor carrier, 'Flexiroll,' which provides true catenary suspension for the conveyor belt under all load conditions.

The Stephens-Adamson Flexiroll carrier features a high tensile spring steel 'dead shaft' to which is mounted a mild steel trunnion and a shock absorbing compression spring. The shaft has an initial set providing a trough which enables the most rigid of belts to make contact with the face of all rollers when the belt is running under all load conditions. Consequently, the Flexiroll carrier supports the belt in a natural arc contributing to more efficient belt training and reduced belt wear.

The new carrier incorporates many desirable design features to provide greater efficiency and less maintenance in conveyor operation. The carrier rollers resist reaction to corrosive, abrasive, greasy, oily and



combustible materials. Natural flexing action of the carrier reduces material breakage, spillage and material build-up.

The all steel jig welded frame is self-cleaning as is the roller assembly.

Greater strength than conventional catenary carriers is provided through the use of the solid spring steel shaft rather than a steel cable which is subject to breakage through constant flexing action.

The Flexiroll carrier is available for 18," 20," 24," 30" and 36" belt widths.

Full information may be obtained by circling number 5 on CF's Information Service Bureau card, page 51.

High-Clearance Sprayer

Hahn, Inc., offers confidential trade information and an award-winning 16-page brochure and catalog on its 1960 line of 'Hi-Boy' self-propelled high-clearance sprayers and accessories. The brochure illustrates uses and benefits of their high-clearance sprayers for corn, cotton, tobacco and other crops, especially designed for applying liquid fertilizers, lay-by weed and insect control chemicals, and chemical defoliants.

For a free copy, circle number 6 on CF's Information Service Bureau card, page 51.

Quick Liquid Couplers

New 4-page bulletin on Kamlok Quick Couplers and other equipment for handling liquid nitrogen is now available from OPW-Jordan. Bulletin F-31 RE is also a condensed catalog and illustrates the Kamloks, fill tank connections, line strainers, sight glass indicators, swivel joints and nozzles, all specifically designed for use with liquid

fertilizers. The bulletin illustrates and describes in detail the composition, safety features, applications and prices of the components.

For free 4-page Bulletin F-31 RE, circle number 7 on CF's Information Service Bureau card, page 51.

Irrigation Injector

Dragon Engineering Company is offering a new bulletin on their fer-

tilizer injector for sprinkler irrigation systems. Described are four models, with recommendations the size system with which each is to be used. Operation of the units is fully covered, along with other helpful information regarding irrigation installations.

For a copy of Bulletin 1960, circle number 8 on CF's Information Service Bureau card, page 51.

Liquid Fertilizer Stabilization

Result of a study into the stabilization of liquid fertilizers have been published by Minerals & Chemicals Corporation of America. The report discusses problems of uniformity and analysis in production of liquid fertilizers and presents results of a study of colloidal attapulgite as an agent to solve these problems.

The eight-page, illustrated report describes formulations tested and presents detailed test results. Methods of dispersing the stabilizing agent are fully discussed. Photographs of treated and untreated laboratory samples, of such fertilizers as 6-12-12, 8-16-16, 14-14-14, and 5-10-10, illustrate the stabilizing action of the attapulgite product.

Titled 'The Stabilization of Suspension Fertilizers with Colloidal Attapulgite,' the bulletin may be obtained by circling number 9 on CF's Information Service Bureau card, page 51.

Multipoint Recorder

A new four page specification describes Honeywell's new Universal Multipoint recorder, which permits changing from 2 to 24 points within seconds. Range and actuation changes are also quick, easy operations. Kits are available for each point, range, or actuation change.

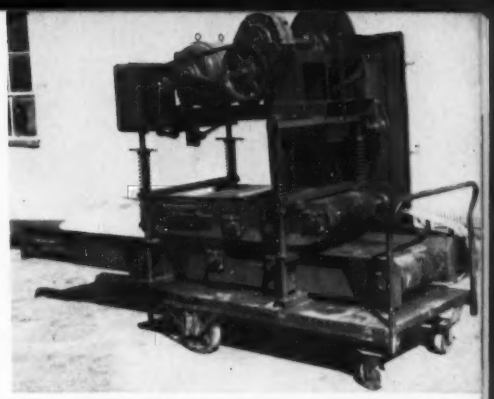
For specification 153-23 containing complete information, circle number 10 on CF's Information Service Bureau card, page 51.

Polyethelene Storage Tanks

Delaware Barrel & Drum Company announces introduction of polyethylene storage tanks in the 500 gallon capacity range. These molded units retain all of the inherent characteristics of polyethylene with particular emphasis on permanent corrosion resistance. Several styles are available—full open head, closed head with openings, flat or conical bottoms. Access and drain fittings are available in wide choice.

Extensive field testing and on-location experience shows no outer support is needed. Tanks are made in virgin natural polyethylene or black for outdoor storage.

For further details, circle number 11 on CF's Information Service Bureau card, page 51.



Bag Cake Breaker

A new material conditioning machine is offered to the industry to break up fertilizer and other materials which have become caked or lumpy during storage in bags. Claim-to work equally well with paper, textile or plastic bags, the unit feeds the bag between endless belts under pressure; the belts are agitated by rollers to produce a rapid kneading action, destroying lumps or cakes without injuring the bag.

For further details on the new breaker, circle Number 12 on CF's Information Service Bureau card page 51.

Diaphragm Seals

Brooks Rotameter Company announces addition of a complete and new line to its accessories for industrial control instruments, diaphragm seals for protection of pressure instruments against corrosion and clogging.

A new catalog, now available for distribution contains full description, specification, and prices of all Brookseal models. For your copy, circle number 13 on CF's Information Service Bureau card, page 51.

Packaging Hints

'Packaging Hints for the Fertilizer Trade' is the caption of a mimeographed article offered by West Virginia Pulp and Paper. Authored by the manager of their multiwall packaging laboratory, the paper reviews styles and materials used in multiwall bags, along with tips on storage of bags, equipment, etc.

For a copy of this paper, circle Number 14 on CF's Information Service Bureau card, page 51.

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5-60

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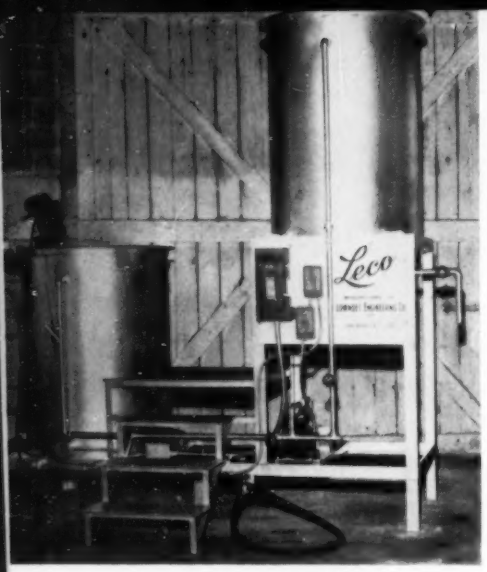


Liquid Mixer

Lowndes Engineering Company has announced a small-capacity liquid mixing unit, consisting of two stainless steel tanks, one for blending and the other for storage. Designed for insecticide blending, the equipment has found use also in the manufacture of liquid fertilizer concentrate by simple dissolution.

The 250-gallon mixing tank is equipped with four 4000-watt heaters to accelerate dissolution, and a propeller-type agitator. The elevated storage tank has an outside spout for use in filling containers for distribution.

The equipment is furnished complete and ready to run, fully powered and wired. The unit occupies 6½ x 10 feet floor area and requires only 10 feet head room.

For further information on the Leco Liquid Mixer, circle Number 15 on CF's Information Service Bureau card, page 51.

Ultraviolet Spectrophotometer

The Beckman 'DB' Ultraviolet Spectrophotometer, a low-cost, direct-reading, double-beam instrument designed for rapid analysis in the 220 to 770 mu wavelength range, is described in the new four-page Bulletin 779.

The DB achieves true double-beam operation through the use of a new vibrating mirror assembly which alternately directs the monochromatic beam through the sample and reference. The instrument fills a wide variety of applications in agricultural and other laboratories.

Copies of Bulletin 779 may be obtained by circling number 16 on CF's Information Service Bureau card, page 51.

Vibrator Locking Wedge Mount

Patent applications on a locking wedge mount for rotary vibrators—designed to eliminate the problem of 'creep-out' existing in previous vibrator brackets—have been filed by the Martin Engineering Company, originators of the 'Vibrolator' line of vibrators.

The new locking wedge mount engages securely in the female on hopper car chutes without the need for blows from a heavy sledge, which results in battered equipment, stuck wedges and damaged vibrators. This firm, positive lock-in of the wedge mounting assures better transmission of vibration.

Removal of the mount is easily

accomplished with a 2-pound hammer swung horizontally, driving the key back into an appropriate slot, where compound wedge action causes positive separation of the locked male and female mount.

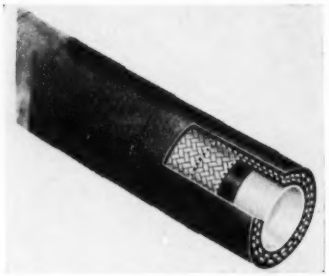
The locking wedge mount, weighing 25 lbs., retails for $40.00 and carries a money-back guarantee of complete satisfaction.

For further information, circle number 17 on CF's Information Service Bureau card, page 51.

Teflon-Lined Hose

A special R/M hose, Flexlon, is claimed to withstand all known chemicals except fluorine gas, chlorine trifluoride, and molten alkali metals.

This hose, manufactured by the



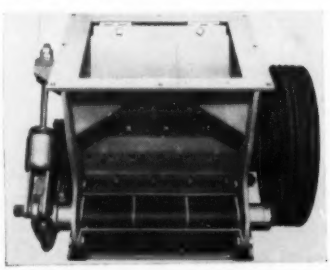
Manhattan Rubber Division, Raybestos-Manhattan, Inc., has very low permeability, and zero water absorption. Since nothing will stick to the waxy Dupont Teflon tube, cleaning and sterilization are easily accomplished. Another advantage claimed for Flexlon is its flexibility and easy handling.

Flexlon Hose construction features a unique bonding of the glossy Teflon tube to the hose body, which is palletizing pattern.

When a pallet is loaded, the turntable is power-rotated to position a new pallet while the loaded pallet is removed by fork lift. More than 1000 bags an hour can be palletized by one man. The bags can be glued automatically to prevent shifting on the pallet. The complete installation is said to be less than half the cost of other machinery intended for this service. The system is described in Bulletin No. 30, available by circling number 18 on CF's Information Service Bureau card, page 51.

Single-Roll Crusher

The Triumph single-roll crusher is now being offered by C. O. Bartlett & Snow Company. The unit is recomended for reducing material which has a tendency to cake or become encrusted in processing. It is said to reduce friable material even



if it is mixed with noncrushable matter. Tramp metal, rocks, stones, etc. are claimed to pass through without damaging the machine or slowing it down. Only 15 to 20 hp are needed to power the crusher to handle from six to 10 tons an hour of 10 lb./cu. ft. material.

For more complete deails, circle number 19 on CF's Information Service Bureau card, page 51.

Hot, Corrosive Dust Control

Ways to lick one of the toughest air pollution problems in industry are presented in a new 12-page bulletin entitled, 'Special Report: Freedom from Hot, Corrosive Dust with

Glass-Bag Filters,' published by Dracco Division of Fuller Co.

Bulletin #806 presents illustrated application data which describes how Dracco Glass-Bag Filters provide virtually 100% efficiency in cleaning hot, corrosive gases in three plants. Temperature of gases filtered in one of the described installations reaches 550°F., just 50° under the maximum temperature capacity of the filters. In another installation, temperature reaches 450°F.

Another section of the bulletin deals with methods of cleaning glass fabric bags. Since conventional mechanical shaking methods tend to fracture glass fibers, Dracco developed two devices that effectively clean bags without fiber injury: a mechanism for dust removal by sonics, and 'Swing-Clean, which imparts a gentle oscillating motion to the tops of the bags.

For copies of Bulletin #806, circle number 20 on CF's Information Service Bureau card, page 51.

Rubber-Lined Tanks

A new bulletin is offered by Gates Rubber Company, describing and giving specifications for their rubber-lined tanks for all types of liquid fertilizers and materials. The literature covers their Series 404 and 405 vertical storage tanks for non-pressure solutions and Series 109 horizontal tanks for pressure solutions.

For a free copy of their MRG-478 presentation, circle number 21 on CF's Information Service Bureau card, page 51.

No Bidding on Phosphate Leases

The signing of the bill by the president makes it possible now for phosphate prospectors to obtain federal leases on their discoveries without opening them to competitive bidding. It establishes 2-year prospecting permits which protect the prospectors' claims. If within that time they can show valuable deposits, they will be entitled to leases on any or all of the lands covered by the permits.

Obituaries

Paul C. Ausley, Potash Company of America, died March 31.

Thomas S. Reynolds, 81, co-founder of Bandini Fertilizer Co., Los Angeles, died at sea February 6, en route home from a 3-week Hawaiian cruise. He was secretary-treasurer of the company.

J. D. Robbins, with Planters Cotton Oil & Fertilizer Co., Rocky Mount, N. C., for 37 years, died April 4 after a long illness. He had been a director of American Plant Food Council, now part of National Plant Food Institute.

SCOTT PAPER INTRODUCES "2-WAY STRETCH" MULTIWALL STOCK

A new step toward reducing breakage of multiwall bags in packaging, shipping, and warehousing operations was taken last month as the Hollingsworth & Whitney Division of Scott Paper Company revealed development of an extensible kraft paper with "two-way stretch."

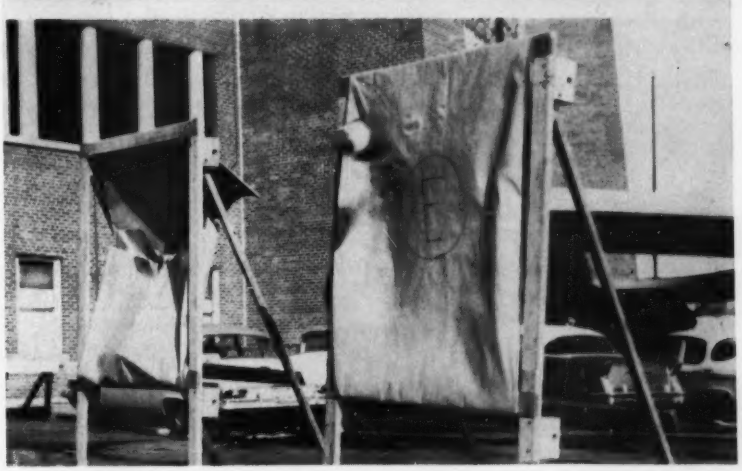
The paper, called "Expanda-Kraft," is stronger than ordinary kraft, it is said, and lighter weight stocks can be used for making bags. Manufactured in three color grades —bleached white, semi-bleached, and natural kraft—Expanda-Kraft has a texture which the manufacturer says gives it excellent printing qualities.

A key consideration was to determine how much stretch the paper should have, both in machine direction (lengthwise in the paper machine) and in cross direction. Paper with too much stretch does not have other properties essential to efficient bag production, Scott officials state, so Expanda-Kraft is being produced with approximately one and one-half times more cross-direction and five times more machine-direction stretch than ordinary kraft. These percentages are claimed to be the optimum to permit the walls of bags to "give" without breaking and to resist puncturing and cracking under strain or impact.

Scott research people say that the stretch given to Expanda-Kraft is difficult to pull out. Thus, the paper does not stretch appreciably when a bag is loaded—it stretches only under force or impact, such as that caused by a bag dropping. The coefficient of friction of the extensible paper is reported to be better than that of ordinary kraft.

Expanda-Kraft also has high resistance to moisture, it is reported—an important factor both in the storage of paper rolls at converters' plants and in the warehousing of bagged commodities, particularly in areas of high humidity.

Scott Paper Company chose a dramatic way to demonstrate its new 'stretch' kraft paper: (**top**) Johnny Unitas, All-Pro quarterback of the National Football League's champion Baltimore Colts, is shown throwing one of his bullet passes from a distance of 50 feet at a target of Expanda-Kraft extensible paper. (**bottom**) Football is shown bouncing off a four-ply target of the new extensible paper. The shattered target at the left which shows the failure of regular kraft paper to resist the force of one Unitas pass.



IMC PANEL PREDICTS GAIN IN US PLANT FOOD CONSUMPTION

Fertilizer consumption for the crop year ending June 30 will equal or surpass last year's record-breaking pace, T. M. Ware, president of International Minerals & Chemical Corporation, told a nation-wide panel of leading fertilizer manufacturers.

Planting forecasts indicate slight increases in acreage for corn, tobacco, and rice, and a six per cent gain for soybeans, he said. An appreciable increase in cotton is also expected. Cotton and corn, as the highest users of fertilizer, account for about 43 per cent of the total U. S. plant food consumption.

Fertilizer consumption for the six months ending December were 8 per cent below the first half of the record-setting 1958-59 crop year, Mr. Ware said, because of heavy precipitation in September, October, and December which slowed or stopped farm work.

His report was made at a meeting of 12 fertilizer manufacturers sitting as a representative 'sounding board' panel to discuss trends, objectives, and problems of the fertilizer industry.

The IMC Customer Advisory Panel is made up of men representing a cross-section of leadership in the industry, who meet on a twice-a-year basis with the top management of IMC.

The meeting at IMC's Administrative and Research Center in Skokie, Illinois (suburban Chicago) March 22-23 is the third since the panel first met at IMC's invitation a year ago. Industry leaders participate on a rotating basis, two new members coming in at each meeting.

One of the major purposes of the Customer Advisory Panel, from an IMC standpoint, was to learn how IMC, as a supplier, could better serve the industry and the panel's opinions on this score have greatly influenced many of IMC's major management decisions. The consolidation of its phosphate and potash divisions into an Agricultural Chemicals Division followed the panel's confirmation of management's belief that IMC could serve the industry more efficiently under such a set-up.

It was also the panel which spurred IMC thinking toward a new concept of technical service to the industry. This new concept, now an IMC actuality, emphasizes technical assistance in the complete manufacturing process rather than on the chemical behavior of a single ingredient.

IMC Customer Advisory Panel: (front row, from left) L. G. Black, president, Ark-Mo Plant Food, Corning, Ark.; John C. Crissey, division manager, GLF Exchange, Ithaca, N. Y.; Alex Mooney, general sales manager, Canada Packers Ltd., Toronto; W. Newton Long, chairman, Miller Chemical & Fertilizer, Baltimore, Md.; (standing, from left) T. F. Bridgers, president, Farmers Cotton Oil Co., Wilson, N. C.; J. D. Stewart Jr., president, Federal Chemical, Louisville, Ky.; Richard E. Bennett, president, Farm Fertilizers, Omaha, Neb.; W. F. Williamson Sr., president-general manager, Louisiana Agricultural Supply, Baton Rouge, La.; Edward D. Kingsbury, vice president, Kingsbury & Co., Indianapolis, Ind. Panelists not shown are W. F. Farley, vice president, E. Rauh & Sons Fertilizer, Indianapolis, Ind., and Arthur R. Mullin, manager, fertilizer department, Indiana Farm Bureau Cooperative, Indianapolis.

The panel's influence has been felt in the establishment of new IMC customer services—in the fields of accounting and purchasing, and in the establishment of a "school of management" to train customer company personnel.

And the panel has been helpful in the area of new product development—approving IMC moves in the direction of higher concentration fertilizer ingredients.

CF Staff-Tabulated TONNAGE REPORTS

FERTILIZER TONNAGE REPORT (in equivalent short tons) Compiled by Cooperating State Control Officials and Tabulated by COMMERCIAL FERTILIZER Staff

	March		February		Oct.-Dec. Qtr.		July-December		January-June		YEAR (July-June)	
STATE	1960	1959	1959	1960	1959	1958	1959	1958	1959	1958	1958-59	1957-58
Alabama	-------	217,636*	53,245	56,732	89,701	108,599	180,959	199,250	846,309	734,077	1,045,574	906,798
Arkansas	68,004	83,695	22,095	21,308	16,911	21,667	58,714	63,767	289,365	226,889	353,132	289,641
Georgia	83,047	93,991	32,254	41,056	161,460	187,378	297,138	294,751	1,130,998	944,618	1,425,749	1,214,147
Kentucky	-------	73,735*	36,846	45,763	59,451	60,108	108,734	99,460	491,920	435,023	583,281	523,794
Louisiana	-------	55,383*	17,104	13,776	31,468	34,219	66,744	64,152	201,642	188,409	265,794	252,601
Missouri	-------	109,907*	32,353	30,831	124,202	198,141	272,014	362,437	563,055	420,615	926,111	755,927
N. Carolina	-------	393,181*	96,844	133,076	115,087	138,453	175,533	228,055	1,468,704	1,261,685	1,696,759	1,461,131
Oklahoma	-------	14,928*	5,440	7,900	26,572	25,438	72,511	68,848	64,738	55,594	133,586	107,400
S. Carolina	179,261	242,056	57,015	87,345	57,460	76,102	104,903	134,202	756,100	615,733	890,302	732,607
Tennessee	62,901	101,386	28,885	32,137	38,359	47,773	117,275	127,116	443,602	307,182	570,718	442,899
Texas	114,332	113,146	51,647	61,617	117,901	119,006	233,410	222,800	441,851	452,327	664,651	666,128
California		(reports compiled quarterly)			253,956	247,473	457,956	453,800	803,261	679,577	1,254,028	1,121,546
Mississippi		(reports compiled quarterly)			-------	86,865*	-------	176,371*	516,917	472,791	693,288	641,262
Virginia		(reports compiled quarterly)			72,546	84,147	141,177	160,178	618,965	549,773	779,143	690,556
Indiana		(reports compiled semi-annually)					321,956	316,341	856,316	795,506	1,172,657	1,080,465
New Hampshire		(reports compiled semi-annually)					-------	4,746*	16,143	16,053	20,889	20,019
TOTAL	**507,545**	**634,274**	**433,728**	**531,631**	**1,165,074**	**1,348,504**	**2,609,024**	**2,971,528**	**9,309,886**	**8,155,852**	**12,475,662**	**10,906,901**

------- (not yet reported) * Omitted from column total to allow comparison with same period of current year.

AD-libs

A department published now and then, when interesting advertising and selling ideas go to work to strengthen our industry.

American Agricultural Chemical are featuring a new packet of laminated aluminum foil and polyethylene designed for them by the Flexible Packaging Division of Continental Can Co. Each contains the right quantity of water-soluble Agrico to make a quart of plant-feeding solution . . . which is just what the home-owner has asked for.

There are two types of packets, one for house plants, the other for African violets. Four packets are packed in shiny foil flip-top boxes, and 24 of these boxes come in Gaircote trays for display.

* * *

Armour is launching the largest advertising campaign in their history to promote all their plant food brands, including Vertagreen and Big Crop. According to their president, W. E. Shelburne, they will run more ads in more publications than ever before. The list includes top-circulation national magazines, daily papers and many leading farm papers. They will also use more radio and TV.

The theme is testimonial in nature, with pictures of Vertagreen users, the text in editorial style. "Watch something beautiful happen" is the key line.

Under the direction of Armour Agricultural Chemical's ad manager, J. Harry Varner, agency Liller, Neal, Battle and Lindsey are doing the job.

* * *

CBS has issued a series of brochures on agricultural advertisers and their use of CBS network TV. Included are Allied Chemical's Arcadian; Dow Chemical's Dowfume. The rest concern such other farm products as Purina Feed.

* * *

Commercial Solvents are featuring a color map of the US, illustrating the 17 important soil groups, set off from each other in various colors, with a color-key so you can tell at once which is which. It is believed this is the first time such a map has been used in advertising to farmers.

This campaign, pushing Hi-D ammonium nitrate fertilizer, runs in Spring issues of four leading farm papers. It was developed by the company's advertising agency,—Fuller & Smith & Ross.

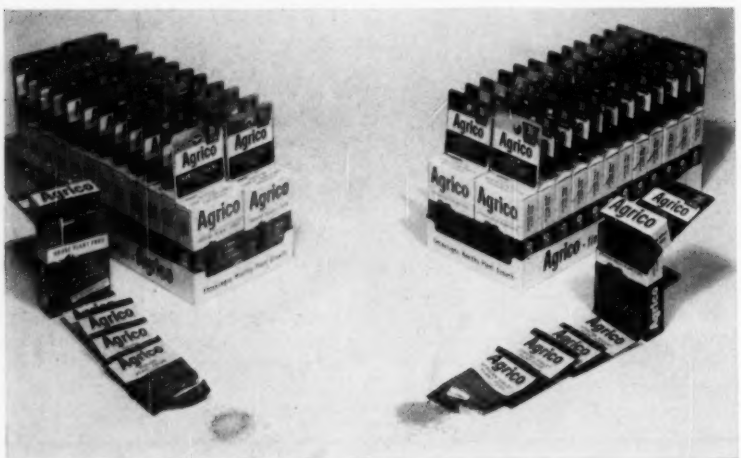
* * *

Ferro Corporation are stressing several themes in different parts of the country. On the Atlantic Seaboard it is "Fertilizers are Getting Better and Better" . . . of course, with the addition of FTE Fritted Trace Elements. Big farm papers with pinpointed circulations carry this story from New Jersey to Florida.

Florida had a "special:" "Come to Florida and learn first hand what FTE can do for soils needing such additives." That was run early, when Florida trips are especially inviting.

* * *

A booklet, "Crop Insurance" points out that "nearly a million acres will be made more productive this year, with fertilizer fortified with FTE." And in their letters to fertilizer mixers in the various areas they hold out this hope: "We are happy that our present customers have sufficient coverage of this mar-



Illustrated here are foil packets, flip type boxes and display trays for Agrico house plant food and African Violet plant food. Each flip type box of 4 packets retails for 35c.

Outstanding in the new line of specialty lawn and plant foods, announced by the Vigoro Research Division of Swift & Company, is a "go-farther" formula lawn food in this carry-out bag. Special new plant foods for roses, evergreens, bulbs, azaleas and camellias are now in handy size cartons to meet the needs of home gardeners.

ket to justify such **supporting** advertising. Maybe next year we can help **you** to bigger sales and improved profits."

* * *

Swift have introduced a number of specialty items this year, with distribution moving right along. Eight of them are new and improved lawn and plant food packages, designed to make it easy for the home lawn keeper to do his stuff—with ease of handling and lightweight formulas due to concentration. Plant food content has been increased as much as 30% in some of these.

Rose, azalea and camellia, bulb and evergreen food fortified with extra iron, for example, are in 3 pound packages for easy handling, and at prices of which Swift is pretty proud. The 35 pound packages have carry-out handles. The high analysis goods are listed as definitely "no burn" and there are no precautionary statements in the directions for use. The advertising says they are **guaranteed** not to burn.

Promotion to the trade stresses new products, packages, pricing "to help build garden supply sales in '60," and to the consumer goes the message in nine of the leading national magazines in and out of the so-called "shelter group." Vigoro specialists are available to put on special events of various types for dealers.

A Good Career . . . Agribusiness

Dean Brooker of the University of Florida College of Agriculture does not quote Gridley to young men. Instead, he points out that people have to eat and wear clothes, and there will always be a need for people to grow the crops. Hence agribusiness is a field with an assured future.

Casual Conversation Produces Guano Bonanza

A friend of George McGuire, retired minister, happened to encounter a man in a hotel lobby, and fall into conversation with him. The man, whose name is unknown, told of bat guano deposits in Southwest Texas, and the friend passed it along to Dr. McGuire.

Result: Dr. McGuire is working up a lease on caves in that area which may yield 100,000,000 pounds, and a big personal yield for the good Doctor. This is the first major discovery of bat guano since Grand Canyon Cave was found 30 years ago.

Safety Section Meetings and Schools

Executive committee meeting, Fertilizer Section, National Safety Council, is to be held June 9th, 1960, at College Inn Motor Lodge, Raleigh, North Carolina.

* * *

Northeast Regional Fertilizer Safety School is to be held at Park Sheraton Hotel, New York City, on August 10 and 11, 1960.

* * *

Midwest Regional Fertilizer Safety School is to be held on August 16 and 17, 1960, at National Safety Council Headquarters, Chicago, Illinois.

* * *

Southeast Regional Fertilizer Safety School is to be held in Wilmington, North Carolina, on August 25-27, 1960.

Alabama Soil Fertility Program

Thirty Alabama counties have launched a soil fertility demonstration program as part of the 1960 Intensified Soil Fertility Program. The demonstrations with the major crops in each county will stress a complete crop production program starting with fertilizing for high yields as recommended by soil tests.

The counties participating are Lauderdale, Madison, Jackson, Franklin, Morgan, Marshall, Cullman, Cherokee, Walker, Pickens, Tuscaloosa, Shelby, Cleburne, Randolph, Clay, Hale, Perry, Fayette, Lamar, Pike, Bullock, Sumter, Chambers, Macon, Lee, Escambia, Coffee, Henry, Butler, Montgomery, and Chilton.

"Small one-twenty-fifth acre plots will be used on most of the demonstrations because they can be more carefully laid-out and supervised, better results can be obtained, there are better comparisons because soil variations are less than on big areas, and it will take less time, money, and fertilizer to get the job done," said J. C. Lowery, Auburn University Extension Agronomist. He also pointed out that the demonstrators will encourage the farmers to follow the recommendations on whole fields leaving out small check plots for comparisons.

The County Agents and their assistants will conduct the demonstrations with the help of Mr. Lowery, Dr. Walter Sowell, Extension Soils Management Specialist, and E. K. Chandler, District Representative of the National Plant Food Institute. The fertilizer is being donated in most cases by the local fertilizer dealers.

The demonstration sites are to be well marked with eye-catching metal signs along the roadside and the individual plots will be labeled according to treatment. Tours are planned when there are visual differences and records will be made of the results which are to be publicized in the newspapers, on the radio, and at farm meetings.

These demonstrations are the second phase of the Alabama Intensified Soil Fertility Program which emphasized the promotion of soil testing as the first step to increased farm profits in a number of counties last fall and winter. The object of the program is to raise farm income in Alabama by the profitable use of fertilizer and other recommended crop production practices.

"Up Fertilizer" Says CFA Meet

Greater use of phosphate fertilizer for optimum production of cereal, vegetable and field crops in California was stressed at the Eighth Annual California Fertilizer Conference.

The session, which attracted about 300 persons, was held in Fresno.

Optimum rate of phosphate fertilization in California is about 160 to 320 pounds per acre annually, according to Dr. W. E. Martin, University of California Extension soils specialist. As a member of a panel, he gave a flannel board presentation, using fluorescent visuals.

Dr. William Garman, Best Fertilizers, in his talk, emphasized the importance of balanced NPK fertilization on irrigated pasture and legumes.

Spectacular results of experiments in application of minor element foliar sprays was presented by Dr. Malcolm McVickar, California Spray-Chemical Corp.

The underlying theme throughout the discussion by these panelists was that California agriculture required multi-nutrient fertilizer.

The California Agricultural Extension Service presented results for use of soils and plant analysis as guides to fertilization. A new manual titled "Water, Soil and Plant Tissue—Tentative Methods of Analysis for Diagnostic Purposes" was distributed.

South American Minerals Offers Data Sheets

South American Minerals & Merchandising Corporation announces that it is now offering the following agricultural chemicals for formulation purposes:

Lindane: 99% Technical Gamma Isomer; Zineb: 66%, 78%, 90% not formulated and 66% formulated wettable powder; Thiram: 65% wettable powder; Ziram: 76% formulated wettable powder; Zinc Sulphate: 36% Monohydrate and 23% Septahydrate; Ferbam: 76% formulated wettable powder and 87½% not formulated; Nabam: 22% active ingredients.

Technical data sheets, prices, and details of packing are available on request from them at 425 Park Ave., New York 22, N. Y.

BREAKTHROUGH ON PLANT RESISTANCE TO DISEASE

A team of scientists has given us the important first step toward understanding plants' physiological resistance to disease—a condition that has long been a puzzle

Presence or absence in a plant of a protein identical to a protein in a disease organism may account for susceptibility or resistance of the plant to that disease organism, according to an article in the April issue of USDA's 'Agricultural Research.'

A study by State and USDA scientists showed this was the case in flax plants susceptible or resistant to different races of the rust fungus **Melampsora lini.** Plants susceptible to a race contained a protein also found in that race; plants resistant to the race did not.

This discovery provides the first concrete evidence of the nature of physiological resistance. Bacteriologist J. A. Doubly of the North Dakota Agricultural Experiment Station, ARS plant pathologist H. H. Flor, and biochemist C. O. Clagett, now at Pennsylvania State University, made the study at Fargo.

In physiological or hypersensitive type resistance, the disease organism enters the plant but does little damage. Invaded plant cells and nearby cells die; so does the pathogen.

Unlike structural resistance to disease, which prevents the pathogen from entering or moving within a plant because of thick cuticle or cell walls, physiological resistance has not been understood. We don't know yet how it works, but the discovery by the three scientists gives the essential first step to learning how and why plants are resistant or susceptible to disease.

Susceptibility, protein linked

Serological tests demonstrated that the rust fungus and flax plants susceptible to it had a protein in common and that resistant plants lacked such a protein. The proteins concerned are of the globulin class. (Globulins are insoluble in water, soluble in neutral salts.)

Identification of proteins through serological methods is based on the same principles that apply to immunization of man and animals against some diseases. When certain disease organisms, proteins, and some other compounds are injected into a warm-blooded animal, antibodies to the injected substances form in the animal's blood serum. Antibodies (which are themselves proteins) render the injected substances innocuous by combining with them.

Antibody-antigen tests used

The antibodies react in the same way whenever the same substance is introduced into the blood. They are specific to the substance (antigen) that causes their formation--a smallpox immunization protects only against smallpox. This is because antibodies combine **only** with their specific antigens—fitting them perhaps as a custom-tailored suit fits only the person it was made for.

Because of this specificity, antiserum (blood serum containing antibodies) prepared against a known substance can be used to identify that substance in laboratory tests. In the precipitation test, for example, solutions of an antiserum and its specific antigen form a characteristic precipitate; if the antigen is not specific to the antiserum, little or no precipitate is formed.

Two types of serological tests were used in the detection of the proteins linked to rust susceptibility. Globulins from each of four lines of flax plants and four races of the rust were prepared and injected into rabbits as antigens, and antiserum for each was obtained. The four lines of flax differed from each other essentially only in a gene controlling reaction to the rust; the four races of rust differed from each other in ability to cause disease on the four lines of flax.

The globulins from each flax line and each rust race consisted of a number of different proteins. In each case, however, one protein was present in greater amounts than the others so that each flax line and each rust race was characterized by one **major** protein. These characteristic major proteins are identified here and in the accompanying diagram as a, b, c, and d for rust races A, B, C, and D, respectively.

Relation of Proteins to Rust Reaction

Flax Lines 1	Resistant to Rust Races	Susceptible to Rust Races	Contained Proteins
2	—	A, B, C, D	a, b, c, d
3	A	B, C, D	b, c, d
4	A, B	C, D	c, d
	A, B, C	D	d

1—Bison 2—Koto x Bison 7 3—Cass x Bison 7 4—Ottawa 770B x Bison 7
Rust race A—1 B—210 C—19 D—22

Resistance studies continue

The tests showed that flax lines susceptible to particular rust races contained, in small amounts, proteins identical to the characteristic major protein of the rust races. For example, flax line 1, which is susceptible to all four rust races, contained proteins a, b, c, and d, in minor amounts. Flax line 3, susceptible to races C and D, contained proteins c and d in minor amounts but did not contain proteins a and b. In each case where a flax line was resistant to a rust race, it did not contain the protein which characterized that rust race. The susceptible flax lines contained a protein in common with their pathogens.

Doubly and Flor are continuing the study of resistance and susceptibility with other flaxes and rusts

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Built-in pest resistance is a need to combat the process of pests developing immunity to chemicals. The plant must be taught to defend itself, according to a paper at the Plant Science Seminar recently, presented by USDA's Dr. Marion W. Parker.

PLANTS NEED MINERALS TO METABOLIZE AMINO ACIDS

If a growing plant is short of one of certain essential mineral nutrients, it may not metabolize some amino acids or form the same amount of protein as plants supplied with all essential nutrients, USDA reports in the April issue of 'Agricultural Research.' But the proteins have the same amino-acid composition as that of normal plants of the same variety.

This was shown in studies at the USDA Plant, Soil and Nutrition Laboratory at Ithaca, N. Y., where researchers J. F. Thompson, C. J. Morris, and Rose K. Gering grew turnip plants in solutions containing all—or all but one—of the essential nutrients. Nutrients tested were nitrogen, phosphorus, sulfur, potassium, calcium, and magnesium. Plants short in any one nutrient were stunted and showed deficiency symptoms.

The combination of amino acids in certain characteristic proportions to form a plant's proteins is apparently regulated by inherited factors. The amount of uncombined amino acids in turnip plants in this study varied according to the nutrient deficiency. However, this variation has little effect on the plant's nutritional value to man and animals since the bulk of the plant's amino acids are combined in the protein.

The amino acid glutamine was high when amino-acid content was high, suggesting that glutamine may be related to the plant's protein metabolism.

When plants were grown without nitrogen, their leaves contained less of the uncombined amino acids threonine, proline, cysteine, and lysine than normal leaves. Roots from deficient plants, however, had about the same content of amino acids as normal plants.

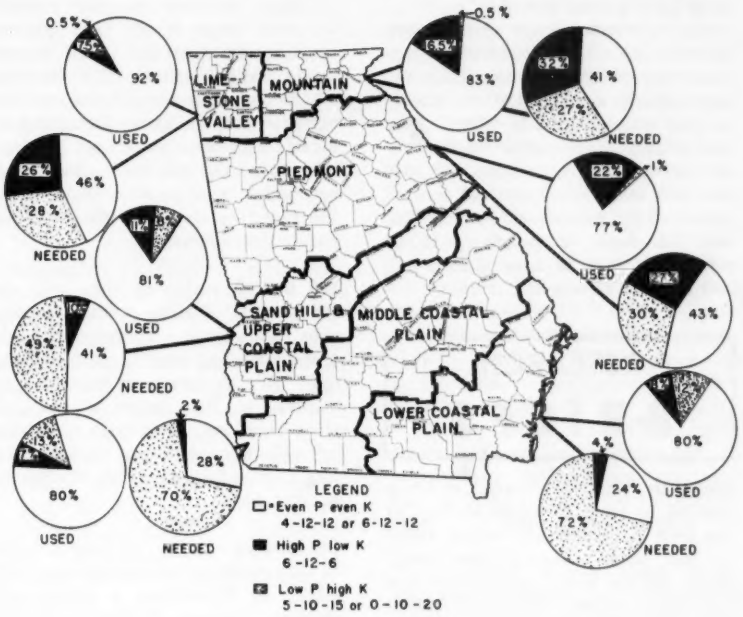
Phosphorus-deficient leaves and roots contained more of the uncombined amino acids than normal tissues, and differences in the glutamine, proline, isoleucine, and arginine amino acids were greater than could be accounted for by the differences in the nonprotein nitrogen. Possibly these amino acids require phosphorus for metabolism. And, the combination of amino acids into protein was reduced by a low phosphorus level.

Many uncombined amino acids were higher in sulfur-deficient tissues than in normal ones, but the sulfur-containing acids (cysteine, methionine, and methylcysteine-sulfoxide) were lower.

With potassium, calcium, and magnesium deficiencies, the leaves had a much higher nonprotein-nitrogen content than normal leaves, whereas the roots showed little difference. This may have been because the deficiency was more severe in the leaf or because the roots responded differently to the deficiency. Values for several uncombined amino acids in potassium- and calcium-deficient plants were higher than normal, but magnesium-deficient plants had lower values.

These findings from the Ithaca tests show that individual nutrients differ in their effects on the various metabolic processes involving amino acids.

Lime has a new competitor as the metals industry realizes the agricultural virtues of their bi-product, decalcium silicate.



GEORGIA AES COMPARES RATIOS NEEDED AND USED

The Georgia Agricultural Extension service has been analyzing soil test and fertilizer consumption data to learn whether farmers are using the ratios of fertilizer their soils need, and they have come up with some interesting and challenging facts for the fertilizer industry.

Extension agronomists Ralph Johnson and Jim Bergeaux point out that basically Georgia farmers need to use only three kinds of fertilizer to meet the needs of any soil fertility condition: (1) a fertilizer even in phosphate and potash such as 4-12-12; (2) a fertilizer high in phosphate and low in potash such as 6-12-6; and (3) a fertilizer low in phosphate and high in potash such as 5-10-15 or 0-10-20.

To learn what percentages of these three fertilizer ratios Georgia farmers should use and what are summaries for 1957 and 1958 were studied by soil provinces. From the results of the soil test summaries, the percentage needs of the three basic fertilizer ratios were calculated. This was compared to the percentages that were actually used in 1958. The needs compared with what was actually used are summarized in the accompanying map-graph.

It is interesting to note the differences between north and south Georgia soils in phosphate and potash requirements. According to this survey, 27 per cent of the soils in north Georgia require a fertilizer higher in phosphate than in potash, such as 6-12-6, while the Coastal Plain soils of south Georgia require only 2 percent of their fertilizer needs in this ratio. On the other hand, 70 per cent of the fertilizer needs in south Georgia should be of a low phosphate—high potash fertilizer ratio, such as 5-10-15, while north Georgia soils require only 29 per cent of their fertilizer needs in this ratio.

This comparison illustrates the need of supplying the correct fertilizer ratio to farmers based upon the fertility condition of the soils in that particular area. For instance, 70 per cent of the soils in the Coastal Plains of South Georgia need a fertilizer higher in potash than phosphate (5-10-15), yet in 1958, only 13 per cent of the fertilizer used in this area was of this ratio.

They point out that this information can be utilized by fertilizer manufacturers as a basis for estimating the approximate percentages of the three basic fertilizer ratios (4-12-12, 6-12-6, 5-10-15) they need to base down for shipment to counties in a given soil province.

Calspray Reports on Yield Contest

To find out what the limits really are on yield per acre, California Spray-Chemical put on a contest called "Break the Yield" under the direction of Dr. Malcolm McVickar, their chief agronomist. Dr. McVickar writes us "not only have we had lots of fun, we've also chalked up some rather spectacular yields. We came up with this contest to encourage our agronomists to become men of vision, and to use imagination coupled with agronomic knowledge."

Here are some of the results:

"When the final scores were tallied, the district with headquarters in San Jose, California, won the honors and is now proudly displaying the rotational Break-The-Yield Barrier trophy.

"Teamwork in this district produced 52.4 tons of tomatoes. Although this did not break the 55 ton yield goal, it came close. The backbone of the fertilizer program was 500 pounds 14-14-14 as a preplant application. The heavy fertilization program lowered the cost of each ton produced by 43¢.

"Other yields achieved the first season were: 41.83 tons of sugar beets with 15.3 percent sugar; 630 one-hundred pound sacks of potatoes; 4.9 bales of cotton; and another tomato yield of 42.54 tons per acre.

"The sugar beets were given 800 pounds 16-16-8 broadcast and disced four inches deep on March 10, prior to planting. An additional 80 pounds nitrogen per acre from aqua ammonia was applied June 20, 30 days after thinning. It was sidedressed five inches deep and four inches from the beets on the water side of the row. Deducting all production costs, the crop returned a net of $134 per acre.

"The 31½ ton potato yield was fertilized with 800 pounds ammonium sulfate broadcast and worked in before planting. At planting time an additional 800 pounds 20-20-0 was used, placing the fertilizer three inches to the side and three inches below the seed piece. The yield on the 10-acre Break-The-Yield treatment out-yielded the rest of the

Dense Turf Spurns Sheep Sorrel, says USDA

Proper fertilization and liming of turf, so as to produce a dense, healthy turf is the best defence against sheep sorrel—a serious lawn and turf problem weed, according to USDA workers at Beltsville.

field by 5½ tons per acre.

"As a result of the first season harvest, it's evident that yield barriers can be broken. The Calspray agronomists agreed that the tomato goal was too low, so in 1960 they are setting their sights on 60 tons per acre. Other acre goals for 1960 are: 325 bushels of corn; 40 tons of pears; 14,000 pounds grain sorghum; and 40 tons of peaches; 10,000 pounds barley; 12 tons alfalfa and 150 bushels of wheat."

RESEARCH BRIEFS

Ingenuity, plus "hardware," is being applied to keep chemists abreast of the new developments which come so fast these days, a man could spend all his time just reading the new information. ACS even has a computer that indexes some 8500 articles from 550 international journals twice a month. Don't let anybody tell you research isn't big business these days.

* * *

A Catalog of all known plants in the world is being put together at the Connecticut AES, under a grant from the National Science Foundation. The whole thing will be put on punch-cards for machine tabulation.

* * *

Spoon-feeding of plants is going to be the result if the coatings developed by Archer-Daniels-Midland pan out in this crop year tests. The idea: to find a coating that will keep nitrogen from leaching, phosphate from being captured by other soil minerals, and govern the rate of potash fed to the plants. "A root can snuggle up to a granule and take nourishment through the film—like a calf sucking a cow" is the way the "Farm Journal" recently described it.

* * *

Grass-legume mixtures studied by VPI agronomists for 10 years have brought interesting results. Alfalfa-orchard grass has been maintained in good stands for 10 years with adequate lime, phosphorus and potash. Ladino clover in an orchard grass mixture failed to survive more than 2 to 4 years. The best ratio for alfalfa-orchard on a Cecil soil seems to be 0-1-3.

* * *

Forestry feeding will bring, in the next 25 years, advances comparable to those fertilizer use has brought to other crops in the past quarter century. So says Dr. C. T. Youngberg, Oregon State. In Europe, where there have not been the forest reserves we have, fertilizing of forests has been practiced for half a century. Oregon State has a project which will provide data when the foresters recognize the need for better management.

* * *

100 bushel yields of corn call for 160 pounds of N to produce plants, cobs and grain. Under favorable crop-producing conditions, fertilizers may give farmers as much as 30 bushels an acre more wheat, 110 more corn, two tons more of alfalfa hay, 13 more soybean bushels. All this from a talk by Floyd W. Smith, Kansas State.

* * *

300 bushels of corn per acre are not as impossible as many a farmer will insist. In Mississippi a young 4-H clubber, Lamar Ratliff and his brother, Lindon, are running test acreage under the NPFI program. In 1955 they set an all time record, the first corn yield over 300 bushels on record. This year the demonstration plot yielded 242.37 bushels, in itself an amazing figure. Rows 30 inches apart, spacing 6 to 8 inches—and plenty of fertilizer. That is a formula to remember!

* * *

Grass is a busy field these days: The Western Task Force of NPFI cites this statement by Dr. R. E. Warnock, member of the team: Ranchers can increase four-fold the carrying capacity of their meadows, or increase hay production three to five tons per acre . . . by taking advantage of fertilization, water control and improved species." He has conducted grazing trials on fertilized mountain meadows during 1956-57-58.

* * *

Tree color can be controlled—so you can have a light or a dark Christmas tree, according to Bill Looney, forester of the Olympic Tree Farms, Shelton, Wash. Fertilizer does it. Fertilizer also produce trees that hold their needles and fresh look longer. But all this must be planned years ahead; it cannot be done overnight.

* * *

Rice fertilizer studies at the Arkansas AES show that up to 100 pounds per acre of nitrogen increased yield of Zenith and Nato rice. But the crop often lodged when more N than that was applied. Bluebonnet and Toro rice can take up to 160

pounds.

* * *

Sugar beets demand nitrogen and phosphate fertilizers along with favorable climatic conditions, good seed and sound management practices—if top beet production is to be achieved, according to sugar beet company and university authorities in California.

* * *

Radioactive strontium does not move from the leaves to the rest of the plant as rapidly as other elements. While in 24 hours only 1.8% of total absorbed strontium had moved from the leaves to other plant parts, radioactive iron had moved as much as 66%, and up to 17.6% had spread throughout the plant in the same 24 hours.

The studies that produced this data were made by T. W. Sudia and A. J. Linck at the University of Minnesota's Institute of Agriculture.

* * *

N for corn. Summary of a study by the Illinois AES during 1943-1959, and published as a pamphlet which is available from the University:

"Hybrid corn has the ability to use large amounts of nitrogen from the soil.

"Growing heavy stands of legumes every fourth year will add enough high-nitrogen organic matter on most soils to take care of the needs of a four-year rotation that includes one corn crop. If a second corn crop is grown, extra nitrogen may be needed in the form of fertilizer unless manure or legume residues are used in large amounts.

"On badly depleted soils the first legume crop may not add enough nitrogen to produce maximum yields of corn. Nitrogen fertilization may be profitable during the first round of the rotation even though the legume will adequately take care of subsequent rotations.

"Catch-crop legumes cannot be expected to supply nitrogen for more than one corn crop.

"Full effect of nitrogen fertilizers on corn cannot be obtained if drainage, drought, stand, soil tilth, or deficiencies of other nutrients are limiting factors.

"On most soils continuous cropping without legumes or manure leads to lower corn yields even though nitrogen and mineral fertilizers are used generously.

"In a humid climate nitrogen fertilizers applied for corn, if unused during the current season, are quickly lost from the soil and are usually not very effective on the following crop.

"Results from the use of different carriers of nitrogen have been very much alike. Their selection should be based mainly on the cost per pound of actual nitrogen applied to the soil.

"Side-dressing has usually given the best returns per pound of nitrogen, but requires more time and labor than broadcasting.

"Most profitable treatment rate for corn is usually 40 to 60 pounds of nitrogen an acre on land that normally yields 70 to 80 bushels. On depleted land that may yield only 40 to 60 bushels, the use of 80 to 120 pounds is suggested if other factors are favorable.

"A good soil improvement program includes the regular use of legumes or legume-grass mixtures and helps to insure efficient production of all crops in the rotation."

Worry about falling water tables may soon subside when, in June it is decided where on the Gulf Coast will be built the long-tube vertical distillation plants to convert seawater. And California will have a flash distillator, possibly nuclear powered, for the same purpose.

* * *

"The route to low costs lies in efficient management that gets more and better crops with less land, labor and time" says NPFI.

* * *

Maybe there's an angle on the current crop chemicals storm in this from Kenneth Dotson of Ohio: "Soil is basic to food production, but few people want dirt in their food. Yet there could be little food without dirt." Except via Hydroponics, Mr. Dotson.

* * *

"Buying the cheapest fertilizer is surprisingly expensive" says Dr. Ewen of Ontario Ag College.

* * *

After a century of experiment, England testifies that chemical fertilizers neither kill earthworms nor bother soil bacteria.

* * *

Kentucky is setting out 20 million trees. Says the manager of a farm which is planting 12,000 of them: "It is just common sense that with everyone cutting trees we will soon be in need of them.

* * *

Kentucky is not neglecting the small farmer. Last year 312 realty loans were made to young family farmers who could not obtain credit elsewhere—by the Farmer's Home Administration.

Industry Meeting Calendar

DATE	EVENT	LOCATION	CITY
June 12-15	National Plant Food Institute	Greenbrier Hotel	White Sul. Spgs., W.Va
June 21-22	Southern Control Officials	Riverside Hotel	Gatlinburg, Tenn.
June 25	Del-Mar-Va Fertilizer Assn.	Geo. Washington Hotel	Ocean City, Md.
July 13-15	Pacific N. W. Fertilizer Conference	Hotel Utah	Salt Lake City
July 27-30	Southwest Fertilizer Conference	Galvez Hotel	Galveston, Texas
Aug. 10-11	Northeast Safety School	Park-Sheraton Hotel	New York, N. Y.
Aug. 16-17	Midwest Safety School	Safety Council Hdq.	Chicago, Ill.
Aug. 21-25	Canadian Fertilizer Association	Manoir Richelieu Hotel	Murray Bay, Que.
Aug. 25-27	Southeast Safety School	----------	Wilmington, N. C.
Sept. 29-30	Northeast Fertilizer Conference	Hotel Hershey	Hershey, Pa.
Oct. 5-6	Southeast Fertilizer Conference	Biltmore Hotel	Atlanta, Ga.
Oct. 17-18	Fertilizer Safety Section	LaSalle Hotel	Chicago, Ill.
Nov. 2-4	Fertilizer 'Round Table'	Mayflower Hotel	Washington, D. C.
Nov. 9-11	National Fertilizer Solutions Assn.	Peabody Hotel	Memphis, Tenn.
Nov. 13-15	California Fertilizer Association	del Coronado Hotel	Coronado, Calif.

Co-op Membership Down, Volume Up in '57-'58

The gross business volume of farmer cooperatives amounted to $14 billion in fiscal 1957-58, according to the latest annual survey made by Farmer Cooperative Service, U. S. Department of Agriculture. This was an increase of about 4 percent over the preceding year. The figure does not include business of associations in Alaska and Hawaii, since they were not States during the period covered, although data are shown for them in the accompanying State table.

Other highlights of the survey: **1.** Number of farmer cooperatives in the United States decreased to 9,716, a net loss of 156 associations, compared with the preceding year. **2.** A small decrease occurred in memberships, with the total number down to 7,485,090. **3.** Dairy products continued to rank first in total marketing volume. **4.** Feed continued in first place among farm production supplies. **5.** Seventy-six percent of all cooperatives handled one or more farm supplies. **6.** Seventy-one percent of all cooperatives did some marketing. **7.** Minnesota continued to hold first place in number of associations and memberships. **8.** California continued to rank first in total net volume of business. **9.** Ninety-two percent of all cooperatives furnished current data for the survey.

After eliminating duplication arising from business done between cooperatives, their total net volume was $10.7 billion in fiscal 1958, an increase of more than 3 percent over the preceding year.

Reorganizations, including consolidations and mergers, accounted for much of the net loss in number of cooperatives—156—from fiscal 1957. The largest number of reorganizations continued to be in the dairy group. Reorganizations were reported, however, by some cooperatives in all other important commodity groups.

The decrease in number of memberships from fiscal 1957 was a little more than 2 percent. The survey on fiscal 1958 is the second consecutive one in which memberships have decreased. This trend is likely to continue with the steady decrease in number of farms.

As in previous years, dairy products led with a gross value of almost $3.5 billion, compared with $3.3 bil-

lion in fiscal 1957. Grain, including soybeans and soybean products, remained in second place with a gross value of $2.62 billion, compared with $2.59 billion in the preceding year. Livestock and livestock products, as before, occupied third place with $1.4 billion in gross value, compared with $1.3 billion the year before.

Among farm supplies, feed, petroleum products, and fertilizer ranked in that order with gross values, respectively, of $1.1 billion, $896 million, and $460 million. These volumes represented increases of $20 million for feed, $50 million for petroleum products, and $24 million for fertilizer.

The number of cooperatives handling farm supplies was almost 76 percent of the total number. Value of farm supplies handled was more than 23 percent of total gross volume. Almost 71 percent of all associations, including those that were classified as farm supply and service cooperatives, marketed some farm products. These farm products accounted for 75 percent of the total gross volume.

Receipts from services such as trucking, cotton ginning, storage, grinding, and locker plants showed a gain of 5 percent over those of 1956-57. Service receipts increased steadily during the 1950's, those for fiscal 1958 being about two and one-half times as large as those reported for fiscal 1951.

Minnesota again led in number of cooperatives with 1,236; Wisconsin was second with 716; and Iowa, with 659, was third.

Minnesota also had the greatest number of memberships—570,525. Illinois had 520,005 and Missouri, 437,095.

In total net volume, California led with a total of more than $1.1 billion. Minnesota ranked second with $751 million, and Illinois was third with almost $651 million. These three states maintained these relative positions on the net value of farm products marketed, with sales of $999.7 million, $598 million, and $509 million, respectively.

New York led in net volume for farm supplies handled with $143 million. Minnesota was second with almost $140 million, and Iowa was third with a little more than $136 million.

California led in service receipts with $28.5 million. Texas was second with $28 million, and Florida was third with $18.5 million.

facts to help you sell

The University of Illinois Department of Agricultural Economics recently put out a bulletin that contains some fine sales pointers for the fertilizer industry. R. E. West and W. N. Thompson of the Agricultural Economics Department collaborated with S. R. Aldrich of the Department of Agronomy to turn out Bulletin 201, titled "Those 1960 Fertilizer Decisions." Your editors feel that many of our readers can use the information to their advantage. Here is the bulletin in full:

"About 70 cents of every $1.00 that farmers take in during 1960 will be needed to cover production costs. The spread between income and costs has narrowed in recent years as prices have gone down and costs have gone up. Farmers are buying more supplies produced off the farm. Supplies of feeds will continue at record levels during 1960, discouraging price increases. The large stocks in government hands must be considered as we make crop-growing decisions for 1960; however, *each farmer has the job of producing efficiently, given government agricultural programs as they are.*

"Illinois farmers used more fertilizers in 1959 than ever before—the large acreage of corn was a major factor. Many farmers have their 1960 fertilizer plans well laid—it is time for others to make these plans. Here are some suggestions for getting the best returns from fertilizers:

"1. As prices of crops decline, it is important to do some sharp pencil pushing. Soil tests, cropping history, and all the judgment you can muster are important in deciding what the yield responses from different fertilizer treatments are likely to be.

"2. Do not automatically cut fertilizer use as prices and income decline. In fact, use of more fertilizer may be the answer to preventing a narrowing of the margin between income expenses. Plant food limitations may be a cause of high per bushel costs.

"3. Consider cutting back on the use of fertilizer, or at least some plant food nutrients, if you have built up large mineral reserves through past treatment. But be careful—you may cut your income more than your costs.

"4. Use fertilizers where they will have the best chance to pay off. For example, when both corn and oat land need fertilizing, fertilizer on corn land will usually pay off better.

"5. If you are short of capital, use the fertilizers that will pay off best in the short run. For example, if phosphorus is needed, putting a given number of dollars into soluble phosphates is likely to pay off better in 1960 than putting the same dollars into rock phosphate.

"6. Apply fertilizers in such a way that plants can use limited amounts most efficiently. For example, one pound of phosphorus drilled for wheat is equivalent to two pounds broadcast for that year's crop.

"7. Buy fertilizers in the form that you can get on the land most economically, taking into account quality, dealer-services, convenience, and cost of application.

"8. Use other practices that will help fertilizer pay off—for example, proper plant population, weed and insect control, and careful harvesting.

"There is nothing magic about fertilization. Farmers have to make a good many decisions in running a successful business. But the decisions they make concerning fertilizer use are important on most Illinois farms."

Asked to motivate company salesmen at sales development conferences for the 1960-61 fertilizer season, George A. Kalteissen, Nitrogen Division's Eastern sales manager for direct application materials, decided to 'build' this 'sales house' shown here. This presentation, given at 2-day meetings in Jacksonville, Florida; Raleigh, North Carolina; and New York City proved to be an outstanding success. So enthusiastic was the reaction that Mr. Kalteissen was encouraged to present the "sales house" idea in other ways. So, with the aid of Albert Sidney Noble Advertising, Nitrogen Division's agency, the "sales house" talk was turned into a booklet, and also a color slide presentation, entitled "How to Sell like '60."

—of This and That . . .

_____Anthony E. Cascino, marketing vice president of International Minerals & Chemical Corp., expects fertilizer consumption for the crop year ending June 30 will equal or possibly surpass the record level of fiscal 1959, in spite of the fact that rain and snow delayed start of the heavy fertilizer sales season in many parts of the country . . . Charles T. Harding, executive vice president VirginiaCarolina Chemical Corp., said indications were industry shipments would be about the same as a year ago . . . The foregoing predictions—made before the floodgates opened on the fertilizer season, could well be under-statements. By mid-April some manufacturers were reporting their "biggest week in history."

_____J. D. Stewart, Jr., president of Federal Chemical Company, Louisville, Ky., was recently cited for distinguished volunteer help to the Selective Service System.

_____Raymond D. Wallace, works manager of Spencer Chemical's Henderson, Ky., plant, has been elected president of the Kentucky Chamber of Commerce.

_____In Sacramento, Calif., state gardener Olrich, who faced fierce legislative criticism in past sessions for the pungent smells wafting from the Capitol Park lawns into the legislative corridors, hopes he has hedged his bets this year. Steer manure has been used only in the eastern area of the park, far from the sensitive noses of the legislators. Around the Capitol a non-smelling form of sewage sludge fortified with nitrogen has been used. The sludge cost $65 a ton compared to $7 a ton for the standard, odiferous steer manure. But, says Mr. Olrich, the sludge covers more ground. Also, last year he insisted nothing makes grass as green as steer manure; now says he is not so sure and admits the sludge is just as good . . . A real die-hard.

_____"The purest grade of elemental phosphorus that has been produced commercially" is the tag placed on a new product of The American Agricultural Chemical Company. Sold by the ounce, this "semi-conductor grade elemental phosphorus" is roughly three times more valuable than gold; currently sells for approximately $100.00 an ounce.

_____Tree farming in the South has boosted Florida into the lead as the nation's No. 1 pulp producer, taking away the top place long held by Washington.

_____At Sidney, Nebr., the Sioux City Depot recovers 90 per cent of the TNT in obsolete 240-millimeter shells by "washing them out." The explosives are dried, boxed and sold by bids. One of the higher bidders is a Canadian firm which uses TNT in the manufacture of fertilizer. Seems it is more difficult to "break down" than "build up" bombs and cartridges. In many of the big bombs, the closing plugs have become rusted and removing them calls for steady nerves and hands.

_____The 580-ft. M/s Alexander T. Wood, which sails under the British Flag, and is registered in London, England, set a new cargo record in Tampa, Fla., by loading more than 20,000 tons of phosphate for delivery to Canada. Recent channel improvements make it possible to handle bigger ships and step up the importance of Tampa as an import/export harbor.

_____Did you know that Texas Farm Products Co. of Nacogdoches, Texas, has purchased The Robin Hood egg plant of Houston? Texas Farm, manufacturer of Lone Star feed and fertilizer, is also the largest egg-producing concern in the Southwest. According to Steele Wright, Jr., president, the name of the Houston firm will be Lone Star-Robin Hood Division of Texas Farm Products Co.

_____At the U. S. Exhibit at the Dutch Floriade, 125-acre world's fair of gardening in Rotterdam, which opened March 25, exhibitors include E. I. du Pont de Nemours & Co., Inc., California Spray-Chemical Corp., Union Carbide Chemicals Co., Ra-Pid Gro. Corp., Boyle-Midway, and Stadler Fertilizer Co.

Del-Mar-Va Association Meeting June 25

According to word from its president, F. N. Strudwick, the Del-Mar-Va Peninsula Fertilizer Association will hold its annual convention at the George Washington Hotel, Ocean City, Md., June 25.

Regional Conference Salt Lake, July 13-15

The program for the regional fertilizer conference to be held July 13-15 at the Hotel Utah, Salt Lake City has been perfected. As the first sessions start early on the 13th, arrival should be timed for the night before.

The Pacific association board has authorized the Agriculture Ammonia Institute to meet in conjunction with this conference, provided they schedule it for the final day.

Pacific N.W. Changes Convention Dates

Feeling that October was a bit too early, the Pacific Northwest Plant Food Association has moved its annual convention dates to November 3-4 at Boise, Idaho. Ralph Nyblad is general chairman; Trevor Steel and Swede Cummings are co-chairman for the program.

NY Bankers Distribute NPFI Brochure

Extensive promotion of "Farming for Profit" by the New York Bankers Association among its members is leading to widespread dissemination of the brochure in New York state.

This 16-page, two-color booklet, published by the National Plant Food Institute in cooperation with Cornell University and the New York bankers group, deals with soil fertility and farm profits.

Fifty-seven thousand copies of the publication have been distributed so far to more than 215 New York banks for use by farmers, 4-H Clubs, FFA members, and other interested groups and persons.

Tobacco No Longer King in Kentucky

Tobacco is moving out of the driver's seat on the Kentucky farm scene. Last year saw, for the first time, the income from livestock and livestock products exceed the income from tobacco.

CLASSIFIED ADVERTISING

RATES: single issue, 8c per word; two issues, 12c per word; three issues, 15c per word; add 4c per word for each insertion beyond three issues. 'For Sale', 'Exchange' and 'Wanted' advertisements accepted for this column must be **paid in advance.**

HELP WANTED

AGRICULTURAL CHEMICALS TECHNICAL STAFF VACANCIES

A leading chemical manufacturing company offers the following opportunities in the agricultural chemicals division of their Toronto, Ontario, Head Office:

1. **Sales Manager**

A senior man, age 35 - 45 years, fully experienced in the agricultural chemicals field is required to manage our sales of fertiliser and stock food chemicals. He should have 10 - 15 years' experience and be qualified with respect to knowledge of the economics and techniques of production and application of these chemicals. A university graduate is preferred.

2. **Technical Service Representative.**

A graduate in chemistry from an agricultural college with at least 5 years' experience in agricultural chemicals is required for technical service work.

Applications, which will be treated in confidence, should be addressed to:

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ELECTRIC REDUCTION COMPANY OF CANADA, LTD.
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ASST. SALES MANAGER—Midwest Multiple plant operation has opening for aggressive person who desires to use knowledge and skill for advancement. Complete resume, age, experience and availability first letter. Box #5, % Commercial Fertilizer, 75 Third St. N. W., Atlanta 8, Ga.

POSITION WANTED

POSITION WANTED: Agricultural engineer, 38, with 4 years experience as assistant production manager, and 7 years as plant manager, supervising production, labor relations, in fertilizer granulation and sulphuric acid plant. Available immediately. Write Box #7, % Commercial Fertilizer, 75 Third St. N. W., Atlanta 8, Ga.

FERTILIZER PLANTS FOR SALE

FOR SALE: Old Est. Ala. 10,000-ton Fertilizer plant. Re-built new 1950; 30 tons wet mix per hour. Modern materials handling equipment. Due to other interests owners sacrificing — Land, Buildings, Machinery and Equipment (A going business) below depreciated value. Inventory at cost. Terms to qualified buyers. Reply box # 6, Commercial Fertilizer, 75-3rd St., N. W., Atlanta 8, Georgia.

USED EQUIPMENT FOR SALE

FOR SALE: On Carrier Conveyor Screen—triple deck used only three years—excellent condition. 14' long x 3' wide. Priced to sell at $2,500. New price—$8,535. Several sections of new screen cloth included, also, 10 H.P. T.C. motor. Indiana Farm Bureau Co-op., 47 S. Pennsylvania St., Indianapolis, Ind.

FOR SALE: Two 7' x 7' T.V.A. Ammoniator Drums—New shells only used for 15,000 tons. Price includes base, tires, and spare repair parts. $2,000 each. Indiana Farm Bureau Co-op., 47 S. Pennsylvania St., Indianapolis, Ind.

FOR SALE: 20,000 gal., horizontal, aluminum storage tank. Working pressure—60 lbs. Used for Nitrogen solution storage, located in Ohio. Box No. 8, % Commercial Fertilizer, 75 3rd St., N. W., Atlanta 8, Ga.

FOR SALE: Payloader, Model HA, ½ yd. bucket, good condition. See at Allen Mobile Home Park, 2520 Jonesboro Road, S.E., Atlanta 15, Ga.

FOR SALE: One Link Belt #814 Multi Louvre Cooler —good condition—Used three years. Indiana Farm Bureau Co-op., 47 S. Pennsylvania St., Indianapolis, Ind.

FOR SALE: Ordinary superphosphate manufacturing equipment (used) consisting of 2-ton Stedman pan, lead measuring boot, Stedman beam scale and hopper, elevator, screw conveyors, etc. Reply Box # 4, % Commercial Fertilizer, 75 - 3rd St., N. W., Atlanta 8, Ga.

FOR SALE: 6' x 50' and 7' x 80' Rotary Dryers, 3 - Louisville 6' x 50' Rotary Steam Tube Dryers; also Mixers, Storage Tanks, Screens, Elevators. Send us your inquiries. BRILL EQUIPMENT COMPANY, 37-61 Jabez St., Newark 5, N. J.

FOR SALE—Stainless steel and Chemical tank trailers, pressure and Non-pressure—304 & 316 stainless. We have complete line of used and new tank trailers. Call us collect, Mayfair 1-2363, Write or wire Hackett Tank Company, Inc., 541 South 10th St., Kansas City, Kansas.

FOR SALE: Unused Sturtevant #9 rotary blender, 150 cu. ft. Sprout Waldron 335 cu. ft. horizontal ribbon mixer, UNUSED. Type 304 stainless steel dry material handling installation including: 1800 cu. ft. weigh hoppers, bucket elevators, shaker and screw conveyors, etc. Perry Equipment Corp., 1426 N. 6th St., Philadelphia 22, Pa.

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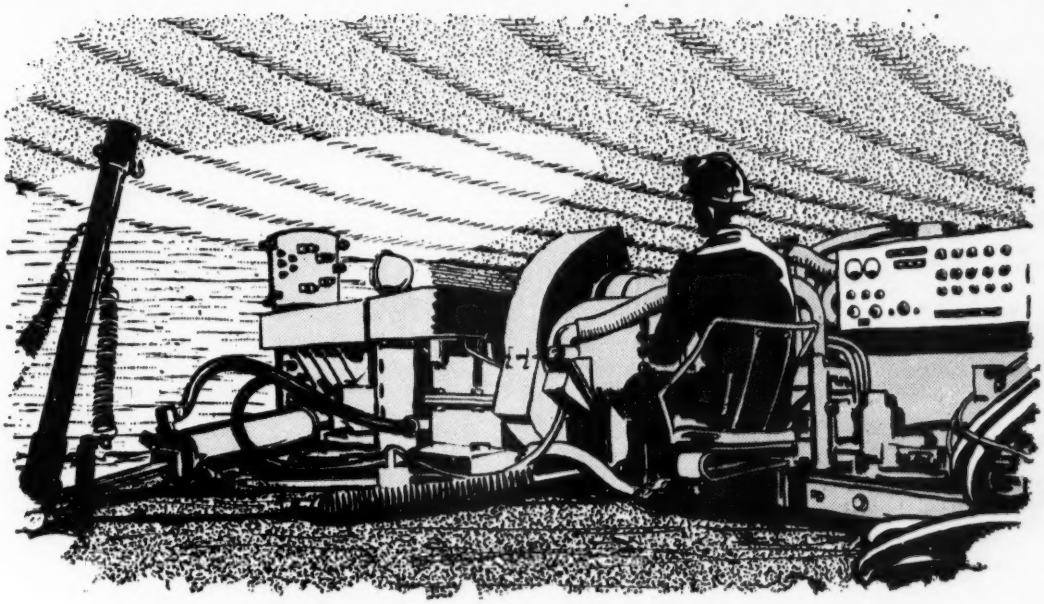

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Multiwall paper bags closed with tape-bound closures add to package sales appeal and provide a bag that can be handled without fear of closure breaks.

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